UNITED STATES FLEET
UNITED STATES NAVAL FORCES, GERMANY,
SENIOR U. S. NAVAL LIAISON OFFICER,
ATTN: TECHNICAL SECTION (MEDICAL),
Room 111, Headquarters
Fourth Medical Laboratory
Heidelberg/Germany
APO 403, U.S. Army

File: P 3 - 1 (b)
Serial: 251-Med.

30 September 1948

From: Senior U. S. Naval Liaison Officer, European Command, U. S. Army, APO 403.
To: Chief of the Bureau of Medicine and Surgery, Attn: Chief, Publications Division.
Via: (1) Technical Officer, U.S. Naval Forces, Germany.
(2) Chief of Naval Operations (Op-32-F2).

Subject: Report of the First Conference of the Medical Consultants to the German Armed Forces - Forwarding of Translation of.

Reference: (a) Letter P 3-1(b), Serial 207, dated 2 January 1948 from Head, Medical Section, Technical Office, Office of the Naval Advisor, OMGUS.
(b) Letter P 3-1(b), Serial 208, dated 2 January 1948 from Head, Medical Section, Technical Office, Office of the Naval Advisor, OMGUS.
(c) Letter P 3-1(b), Serial 224, dated 26 February 1948 from Assistant Technical Officer (Medical) U.S.Naval Forces, Germany.
(d) Letter P 3-1(b), Serial 232, dated 24 March 1948, from Assistant Technical Officer, (Medical) U.S. Naval Forces, Germany.

Enclosure: (A) Subject Translation (Project I, Folios IX and X).

1. Due to its bulk Enclosure (A) will be forwarded under separate cover direct to each of the below listed recipients of a copy of this letter.

2. This is the final portion of Project I of this section, parts of which have been forwarded previously by references (a), (b), (c) and (d).

3. The editing of these folios was completed by Commander Harry J. ALVIS, (MC), USN., as Head of the Medical Section before his return to the U.S. The mechanical completion of the folios was continued by a portion of the medical section which is presently operating under the administrative supervision of the Senior U. S. Naval Liaison Officer, EUCOM, HQ., APO 403.

4. The reserve supply of these folios is limited. It will be forwarded to the Bureau of Medicine and Surgery, Publications Division on a Government Bill of Lading. Requests for additional copies or further distribution should be addressed to that office.

N. W. ABRAHAMS,
Captain, U.S.N.

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NAVAL TECHNICAL UNIT, EUROPE
OFFICE OF NAVAL ADVISOR
OFFICE OF MILITARY GOVERNMENT FOR GERMANY (U.S.)
Medical Section
Room 124, EUCOM HDQTRS.

FOREWORD TO THE TRANSLATION

OF THE REPORT OF THE FIRST CONFERENCE OF THE MEDICAL CONSULTANTS TO THE GERMAN ARMED FORCES.

These folios (IX and X) contain the translation of the report of the First Conference of the Medical Consultants for the German Armed Forces held 18 to 19 May 1942 at the Military Medical Academy, Berlin, Germany. They are of interest in that the problems encountered in the previous winter on the Russian Front are discussed. This meeting was the first general meeting held after the reorganization of the high command and the assumption of supreme authority by Hitler.

The practice of holding such conferences and of having a medical consultant group was as old as the history of the medical service of the German Army and may be said to date back to the days of Frederick the Great. Under one plan of organization after another the practice had been continued until it came to this form in the late war. A Medical Inspectorate was established over the Medical Services of the various branches of the Armed Forces. A scientific consultants group was formed from the various similar groups of the branches of the Armed Forces and it was this combined group that met here for the first time and thus this was called the First Conference.

The distribution of this translation brings to a close the original project of this section. Approximately 1000 pages of German text have been translated to complete this series of ten folios. Taken together they give a fairly complete cross section of the problems confronting the Germans after the first winter of the Russian campaign. It was possible to complete this work only by the cooperation of many elements. The photostatic copy of the original text from which the translations were made was loaned to this section by Lt. Col. James BLAISDELL, Medical Corps, Royal Canadian Army, while he was Head, Scientific Branch, F.I.A.T. (British). Encouragement and cooperation was received from many offices of the European Command, U.S. Army and U.S. Naval Forces, Germany. If special note is given anyone it will have to be the group of unnamed German translators who hour after weary hour slogged on through the wilderness and vagaries of technical terminology in trying to produce an understandable translation of ideas without changing the general format. From beginning to end it has been the attempt to set down sentence by sentence, in the same order as found in the original text, the ideas expressed there. Only one who has contended with this problem can appreciate what that means. The editing of the preliminary translations is looked back on as a sort of translators Pilgrim's Progress. No misconception is held that these translations are an example of English literary style. Reading the various drafts of the translations was exhausting but never dull. It is believed that the reader will find them interesting and sometimes surprising if he will think of them as problems that were matters of concern. Why this should be in some cases is an unanswered question. The trend of some of the discussions at times makes interesting reading even though one does not agree with the opinions expressed.

So once again the last has come first and the first has come last and the job is done. We close the cover on the last folio knowing that whether these translations are ever used or not they will occupy a prominent place. Even though it may be on some forgotten dusty shelf far back in the files they occupy so much space that even there they will be seen from time to time, though mayhap only from the outside. For the sake of a weary humanity the hope is expressed that such a series of reports will never again be compiled.

HARRY J. ALVIS,
Commander, Medical Corps,
U. S. Navy.

INDEX FOR

R E P O R T

OF THE

FIRST CONFERENCE OF SPECIAL MEDICAL CONSULTANTS

18 - 19 MAY 1942

MILITARY MEDICAL ACADEMY, BERLIN.

* * *

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

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PREFACE TO THE REPORT

On 18th and 19th of May 1942 the First Conference on the problems concerning the war in the East was held in Berlin. It was the purpose of this conference to check on the directions and instructions in the field of medical science issued during the past time by consultation of small workteams of Consultant Specialists of the different fields. It is only natural that those problems were discussed first, which were most urgent according to the experiences made during the Eastern Campaign.

Due to the difficulties of transportation, the great distances as a result of the extended frontlines of the different armies, and the frequently varying combat situations, only a certain portion of the Consultant Specialists could be invited to this Conference. As far as can be foreseen at present the same will hold true for future Conferences as well. The results of the discussions were laid down and directions for the different fields of work were derived therefrom. With the publication of the reports of this Conference the Commanding Medical Officers and all Consultant Specialists will be informed accordingly.

This booklet contains suggestions in the field of medial science. Its distribution will not affect a change or supplement the leaflets (Army Manual 209/1, Army Manual 209/2). In addition it must be pointed out, that no essential changes appeared to be necessary according to the results of this Conference. The results of the "Conference East" will be taken into consideration during the preparation of the new edition of these leaflets of the Army Manuals. The results of this Conference and the suggestions given in the discussions ought to be complied with from now on, if this does not involve any basic organizational changes.

The Army Surgeons, Commanding Medical Officers as well as the Consultant Specialists have to direct their attention especially to the practical effect of the scientific results of this Conference.

A small number of copies of this booklet is forwarded for the use of all larger hospitals.

/s/ Dr. HANDLOSER

Speech of the Army Medical Inspector.

Gentlemen!

The first central war-conference of the consultant specialists took place on the 3rd and 4th of January 1940. It is of interest and necessary to repeat the subjects discussed in this conference:

1. Wound-treatment, especially in case of injuries to the extremities. Infection of wounds.

2. Blood-transfusion under field conditions.

3. Injuries due to chemical warfare.

4. Dysentery.

5. Neurosis, psychopathy and organic diseases.

6. Distribution of patients and problems of the evacuation of wounded.

The lectures and the subsequent discussions were printed and distributed through the official channels, so that the results of the conference will become known to all medical officers.

The Scientific Senate for the Army Medical Service in its session on 28 October 1940 dealt exclusively with the subject "Gas-gangrene" and the following problems have been discussed:

a. Is gas-gangrene to be considered as a uniform disease with regard to prophylaxis and therapy?

b. Is there any hope that chemical remedies will show prophylactic and therapeutic results?

c. Prophylactic and therapeutic value of the gas-gangrene serum?

d. Which prophylaxis and therapy should be applied?

In a further session of the Scientific Senate on the 2nd of December 1940 the problem of "prophylactic immunization was discussed and the following questions have been raised:

a. Does a single prophylactic immunization against typhus promise the same success as three vaccinations?

b. Is a prophylactic immunization against dysentery necessary, and which serum should be employed?

c. Should an active immunization against tetanus be introduced?

d. What is to be thought of the combined immunization - tetanus, diphtheria, typhoid, paratyphoid A and B.

Since then the unsettled problems of importance have been discussed in numerous decenterialized field conferences in the area of the army surgeons and commanding medical officers of the occupied territories, and new experiences have been added. In a continuing series of leaflets the status of the results of these experiences is being made known to all medical officers.

If from many sides the objection is raised that the mass of the medical officers is too little informed about the events in the field of medical science during this war, I wish to point out at this place that we have at our disposal a periodical which covers all fields of military medicine, namely the "Deutsche Militaerarzt" - the German Military Surgeon - to which e v e r y medical officer interested has access. He will find there the information about the basis of any problems to be discussed as well as information about the progress and change of the efforts to find the best solution. In addition to complete single reports there are always pertinent and complete directions of leading consultant specialists in all fields which are supposed to be a guide for all of the medical officers of the Armed Forces in the field as well as in the homeland.

Something should be said about the often criticized censorship of scientific publications during the war with a limitation of the possibilities for publication. Anybody who is fully aware of what is going on knows how eagerly the enemy press abuses even the most harmless figures and statements concerning the state of health within our Armed Forces for the most intensive propaganda against us and our military strength without abstaining from severe distorsion as soon as they believe to have found even a flicker of facts suitable to their purpose. In certain fields of prophylaxis as well as therapy it is not the purpose of our publications, to help the enemy with <u>our</u> research work and thus to promote his military strength. This is the point of view from which I would appreciate your understanding of the limitation of scientific publications, which is due only to the particularities of the conditions of war. The hitherto centralized censorship of scientific publications has now been turned over to the branch offices, the army surgeons and the medical officers in the military district headquarters in order to avoid or reduce any possible difficulties by a more close contact between the author of the article and the censor.

The present war requires the employment of the utmost strength. I know that each one of us does his best and makes the utmost effort. In order to achieve this a close and parallel cooperation is first of all necessary, as well as a certain understanding for the limits of the humanly possible achievements, which limits have once and forever been set by the peculiarities of this war. In addition the limitation in a personal as well as in the material respect have to be taken into consideration. Critiques can only be useful if they are correct and based on experiences and if they are combined with suggestions which would lead to an

improvement, however, these suggestions must be such that they are practical. Criticism alone cannot lead to a progress and this is useless. However, we will greatly appreciate any assisting cooperation as well as any useful advice. I shall heartily welcome such assistance into our circle so that the individuals may participate in the work and share the responsibility.

I considered it useful and necessary to discuss these matters in principle.

Since the First Conference of the Consultant Specialists held during this war it was no longer possible, due to the conditions of the war, to hold a second war conference of the same extent.

For various reasons the number of participants of the present Conference East had to remain limited. On the one hand it was impossible to take all consultant specialists away from the eastern front, on the other hand the directions referring to the limitation of traffic caused such unsurmountable difficulties that it is impossible to bring about a meeting of a larger extent. As indicated in the title of this conference, medical scientific problems due to the eastern warfare have to be dealt with in principle. The course of this eastern campaign, the extent of the Russian territory, the cultural level of the Soviet Union and her population, the comparatively scarce means of transportation in Eastern Europe and finally the hazards threatening by always possible epidemics coming from the Asiatic area, and in particular the last Russian winter which we have just overcome have in numerous cases confronted us with entirely different problems than was the case in earlier campaigns during this war. We have gathered a lot of experiences thereby, and as a measure of precaution they will have to be evaluated for the coming winter.

We will now discuss the directions which will be valid for this conference. In short discussions, dealing with the important factors only and disregarding all known facts, the examinations will be carried out along the following two lines.

1. What is the present status of the problem concerned?

2. Which measures and which new directions should be derived therefrom?

I would greatly appreciate, that the results are put down in writing in the morning of the second day of this conference.

If my predessor, the late Generaloberstabsarzt (Lieut. General (MC)) Prof. WALDMANN suggested the directive motive for the First War Conference of the Consultant Specialists to be the question: "What can I do to strengthen the militar power", this applies equally to this conference. I wish to point out, however, that all problems are to be understood

and dealt with in a purely scientific manner. Suggestions concerning the organization of the Armed Forces Medical Service can be made only as comments. The problems with which we are confronted as a result of the injuries due to cold require special attention with regard to the preliminary work of the Army Medical Inspectorate. Therefore, the problem of injuries due to cold has been included in the program of all groups of specialists with the exception of the psychiatrists.

Much was expected from the chemotherapy of wound infections with regard to the administration of sulfonamides. Unfortunately the experiments performed thus far which have been numerous enough and were performed in various theaters of the war have never led to clear results.

In contrast hereto very satisfactory results have been gained in the field of blood-substitutes. The preserved blood serum developed by Oberfeldarzt (Lt. Col., MC.) Dozent Dr. LANG has proven to be very useful. We will do our best to see that this preserved blood serum will be available to the largest possible extent during all larger campaigns in the future.

It was the psychopath who caused numerous and serious difficulties to the commanding officers of the troops and the medical officers in the field. No commanding officer of a unit likes to have a psychopath amongth his men. This is the reason why the psychopaths frequently reach their desired aim of getting away from the troops.

Typhoid was of particular importance during the past winter in Russia for the work of the hygienist, the internist and even the surgeon. From the epidemiological point of view the clarification of the problem of infection caused by dusty fecal matter of lice has caused considerable concern among the physicians of the homeland as well as the numerous commanding officers of the troops. Statements have been made that any delousing is useless unless it is combined with a disinfection of the dust of fecal matter of lice.

I am now going to discuss the important field of disinfestation. During the hard winter campaigns it could be performed only very seldom among the advanced units; but even at those places where delousing establishments have been set up, numerous errors have been made in spite of all orders issued previously. It is the important mission of the Consultant Specialists, particularly of the hygienists and internists to check on all delousing establishments for the troops and hospitals continuously and energetically. They have to assure a well-functioning and rapid disinfestation from lice by consultation and direction, employing their full authority.

In addition to the strictly professional problems of thi conference a number of miscellaneous lectures has been put on the program. The subjects of these lectures are of no less importance than other discussions, otherwise I would not

have put them on the program. It is just the Consultant Specialist who makes any acquaintances within his army and who must always be fully aware of the fact that he is always responsible with his name and his authority for what he says. He should not limit his points of view and his statements to the actual field of medicine, but he should try to contribute his best to our victory in conversations with medical officers and medical corpsmen as well as with troop-officers and men of other branches of the Armed Forces. The lectures which will be held on Tuesday afternoon will supply material and hints in this respect.

Medical work cannot be directed by rigid instructions. In spite of this, however, certain instructions are necessary from time to time for the medical officers in the field and in hospitals, particularly with reference to public health problems. These directions must not be based on theoretical experiences but on practical medical experiences in the theater of operation. This is the reason, Gentlemen, why I have invited you to this conference and why I wish to hear your points of view. After all, you are coming directly from the armies. Everything you have reported during the campaigns has been evaluated so that it can be used as the basis of your lectures.

In order to obtain a more intensive exchange of opinions among the Consultant Specialists of the different armies I have planned to publish short circulars in the future which will have been prepared by my Consultant Specialists from the reports of the Consultant Specialists of the different armies and the commanding medical officers. They will be distributed as promptly as possible.

At the end of my speech I wish to call your attention to an experience made during the past winter:

When the cold of the winter and the enemy action increased more and more, some soldiers showed a more considerable desire of managing to get back home. We were not always in a position to direct them along such lines into which they should have been directed. I realize that the conditions were harder in those days than some human beings could endure. As a matter of prevention, however, we, the physicians, have to accept the attitude of a certain sternness in such critical times of the war, which prevents the possibility that a man who is less interested in the service can get back home. The most difficult thing of this objective is to balance the emotional qualities with each other and I believe that even more exact rules and instructions will have to be issued in the future than was the case previously. It is also the mission of the medical consultants to educate our medical officers in the field in this sense. The frequently difficult decision between the human love and a military necessity, between medical ethics and military sternness has to be made with a willing responsibility.

Two medical officers from the circle of the consultant specialists have been killed during the Eastern Campaign: Oberstarzt der Reserve (Colonel, MC., Reserve) Prof. SELIGER, Consultant Surgeon of the 17th Army was killed on the 6th of August 1941, Oberstabsarzt der Reserve (Major, MC., Reserve) Prof. SOMMER, Consultant Surgeon of the 6th Army died suddenly on the 12th of October 1941 with the Field Army.

We will always remember them as men who have always faithfully fulfilled their duty in addition to all those German medical officers who sacrificed their lives in Russia, in the Balkans and in Africa. Let us rise in tribute to these soldiers.

It is my desire to thank you, Gentlemen, for your faithful work in these hard times. If the lives of numerous wounded soldiers have been saved and if they have regained their health, if the outbreak of disastrous epidemics in the Army and in the homeland has been prevented, we can be proud of this success of the work of the German physicians. One will always find them ready and indefatigable, equipped with the best mental and material means to work for the sake of our fatherland.

All knowledge, consultation and research work will gain its full success and appreciation by <u>action</u> only. It is the purpose and the mission of this conference to pave the way for German science, and further it for the sake of our marvellous soldiers.

I.

AMPUTATION TECHNIQUE

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

1. Amputation technique. (Abstract)

Oberfeldarzt (Lt. Col., MC.) Prof. FREY

During World War I, the German military surgeons made too few and too late amputations. There is still no uniform opinion concerning the technique of amputation. Objections are raised against the flap method. Even the largest flap is insufficient for a complete covering of the stump. One is never able to perform a secondary suture. Amputations in the field are made in order to save lives, and not to preserve a nice stump ready for prosthesis. In 95 per cent of the cases a second amputattion has to be performed. Therefore the complete amputation has to be divided into two portions during the war:

1. Into the live-saving amputation at the front, which will be performed at or slightly above the wound and

2. Into the final stump-shaping secondary amputation, which will be made in the homeland under completely quiet conditions.

FREY recommends the method saving most lives and most material.

Discussion:

KRUEGER: Agrees with the opinion of FREY to perform the amputation at or slightly above the wound.

PEIPER: Expressed his hesitancy to approve the method of FREY to perform the operation at the wound because of the destruction of the soft parts and the danger of an anaerobic infection.

KILLIAN: Fully agrees with the principal of FREY.

FRUEND: Agrees with an amputation at the wound. The amputation method of KALANDER is very suitable in case of a suspicion of gas gangrene, as it does not involve any large transverse incisions of the muscles.

GULEKE: If flaps should remain, they can be turned toward the outside. In general a conservative treatment should be applied in case of amputations due to injuries resulting from injuries due to cold.

ZIAJA: No far reaching generalizations should be made as a result of the catastrophic conditions of the winter campaign of this year.

WACHSMUTH: Agrees fully with the principles of FREY. The major principle of the field amputations is economy. The problem of flap-incision or circular-incision should not cause any quarrels. The method of incision depends solely on the indication and the individual case. It is always wrong to enforce the execution of a method according to the procedures of a certain shool. One has to be even more careful in cases of frostbites. Demarcation has to be waited for. Should one wait for a complete spontaneous detachment?

SAUERBRUCH: The damage to the vessels and tissues extends centrally far beyond the demarcation line. In order to avoid late necroses, the amputation should be delayed at least for 3 - 4 months.

FREY: The Pirogoff-stump is not as bad as is generally maintained. The scheme of the amputation should not be according to VERTH, but according to the principle "to save as much as possible".

ENGELKE: Forefoot-stumps! VERTH neglected the Pirogoff- and Chopart-stumps. VERTH's method for prosthesis is good for permanent treatment.

GULEKE: One should not judge the fore-foot stumps equally. Contrary to the Pirogoff-stump, the Chopart-stump for instance is absolutely useless.

FREY: Dictated principles concerning the technique of amputation under field conditions!

Directives:

It is the task of the field surgeons:

1. to preserve the life,

2. all the material possible, that is important for a later treatment of the stump, should remain.

It is not the task of the field surgeons to form so-called stumps ready for prosthesis. The best method of amputation for the field surgeon is to amputate the extremity at the wound or slightly above the wound. If the zone of destruction is situated near the joint exarticulation should be considered because of the danger of a subsequent empyema. It must be clear that almost every primary amputation performed in the field requires a subsequent amputation. This fact must be taken into consideration during the first wound treatment. Therefore it does not mean much if the stump looks somewhat ugly at the beginning and if useless or hindering remnants are left which are of no use for a later adaptation of a prosthesis. The final shaping of the stump is a matter of the second amputation which as a rule is performed in the homeland. During this operation the rules of peace time surgery will be followed. The

problem of the front-line surgeon therefore does not consist of the question of whether or not he should apply the flap-incision or the circular-incision during his amputation. In case of a primary use of either of these procedures too much would have to be sacrificed in case of an amputation performed according to peace time rules. In every other respect the amputation at the wound is performed according to the rules of the surgical treatment of wounds in war, i.e. tissue which will no more recover will be removed, caverns and pockets will be opened widely.

II.

GUNSHOT INJURIES OF THE BRAIN AND THEIR TREATMENT, COOPERATION BETWEEN NEUROLOGISTS AND SURGEONS.

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

1. Gunshot injuries of the brain. (Abstract)

Oberstabsarzt (Major, MC.) Prof. TOENNIS

The speaker is in favor of the directions for an early treatment in effect since 1915, in contrast to the fatalistic conservative opinion of BERGMANN which can still be found. In addition he favors the closed treatment, the complete curettage of all hematomae and splinters, close suture of the dura along with a periosteum-galea-flap plastic operation during the first days. The decisive question during the operation is whether or not the dura has been opened, and whether or not a prolapse exists. All patients with a primary prolapse who received no treatment will die. In general the infection will remain limited locally in cases without a prolapse.

2. Concerning the cooperation with the neurologists in case of the treatment of soldiers suffering from gunshot injuries of the brain.

Oberstabsarzt (Major, MC.) Prof. v. STOCKERT

As regards the problem of a cooperation of the neurologists during the surgical treatment of soldiers suffering from gunshot injuries of the brain, it appears to be desirable to have a neurologist in charge of such wards of a field hospital, where the larger portion of the patients consists of soldiers suffering from these injuries. These patients should if at all possible be separated from the rest of the wounded. The majority of the extremely busy surgeons will welcome this suggestion. In case of open injuries of the brain it is indicated to perform the operation immediately so that in this case the advise of the neurologist will hardly be necessary. In spite of this fact, however, he should be present during the operation and if he is sufficiently qualified should assist the surgeon. The first decisive question which rises usually is whether or not the dura should be opened in case of a tangential gunshot wound which has affected the bone only but which has left the dura uninjured. In spite of the fact that the surgeon will in general feel very little inclination to open the dura because of the danger of an infection, this will be indicated in most cases where the focus of destruction located underneath the dura has led to clear focal symptoms during the first hours. This is the first opportunity where the neurologist will have to express his opinion which will be decisive for the operation. His principal mission, however, is a critical observation of the clinical course during the first days particularly as differential-diagnostic difficulties will occur in this respect. A subsequent hemorrhage can be the indication for a second operation in case of a primarily treated open gunshot injury of the brain or it can indicate an opening of the capsula of the skull in case of a closed

gunshot injury of the brain. As these operations involve a new particular hazard for the wounded, the indication should be given only after a most careful consideration in order to avoid any errors. It is the exact clinical observation of the patient which is decisive in this case. In order to be able to perform these exact clinical observations, however, an exact knowledge of the so-called physiologic range in the field of symptomatology of fresh gunshot injuries of the brain is of importance.

It is known to us by peace time surgery that ROETTGEN, SELBACH and myself were able to prove in the neuro-surgical clinic of TOENNIS at Wuerzburg that serile inflammatory reactions have arisen subsequent to an operation of the brain performed with all aseptic precautions. These inflammatory reactions have caused a swelling of the brain and have become evident in the form of an organic disturbance of consciousness which increased as far as a deep stupor (profound sleep, unconsciousness). This status has reached its peak after forty eight hours and has subsided again after three to four days. In case of open injuries of the skull this corresponds to the fact that the wounded soldier frequently has to walk to the advanced dressing stations with his gunshot injury of the brain and frequently with a considerable prolapse. Upon reception to the hospital and also later on he is able to remember all details of his being wounded, however, he himself states that he lost consciousness during the evacuation in the ambulance car on the bad Russian roads. It is not seldom that a soldier suffering from an injury of the skull arrives in a pretty well informed state, becomes confused after a couple of hours, and shows a completely apathic and disinterested clinical picture on the next day. The wounded do not talk, they must be fed and they discharge urine and fecal matter unconsciously. Consciousness is regained only after several days and a lapse of memory of the events during these days will remain. In spite of a successful removal of a bullet, a bone splinter and of destructed tissue remnants this clinical picture will develop with an increasing and decreasing course. Therapeutic measures can consist of drainage (entwaessernde Massnahmen) injections of glucose and even of intramuscular injections of Salyrgan in case of a dangerous swelling of the brain. During the dysentery epidemic the drainage effect of the diarrhea was particularly impressive which has led to reduction of these marked prolapses. A sudden and unexpected change of an apathic clinical picture into an excited hallucination has to be considered as a particularly unfavorable symptom. The wounded man becomes restless, he wants to leave his bed, is frightened and shows the typical symptoms of hallucination. With the greatest probability all these symptoms indicate the onset of a meningitis which frequently results in an accumulation of pus in the base of the skull and thus causes an irritation in the area of the hypothalamus. The interruption of the apathic syndrome frequently is the initial symptom, although macroscopically a completely clear liquor can still be proven, even if microscopically a distinct increase of the number of cells has already been observed. If one succeeds in keeping the meningitis under control by an intensive sulfonamide treatment and by repeated careful lumbar puncture, this state of excitement will be replaced by the apathic syndrome which in turn will subside slowly.

Finally I want to mention the occurrence of focal symptoms during the stage of congestion of the brain, which are already known to us from the clinical pictures following operations on the brain. Thus for instance we have observed aphasic disturbances in speaking (aphasia) in 25 per cent of the patients in our hospital, which can be subdivided into 20 per cent motor and 5 per cent sensory aphasiae. While we could observe a direct injury of the left temporal lobe in many cases of a sensory aphasia with an impaired understanding of speech, we have observed a real injury of the left frontal lobe of the brain in only 25 per cent of all cases of motor aphasia with inability to articulate. In 25 per cent of the cases the motor aphasia could only be considered as a secondary symptom of the brain congestion. This means practically that a sensory aphasia must always be considered as a symptom of a direct injury of the left temporal lobe, while the motor aphasia has no such local significance. The reason for this must be seen in the particular liability to congestion of the frontal brain which functionally gives rise to temporary focal symptoms.

Taking into consideration the limited amount of time which is at my disposal, I wish to mention these few examples only and to demonstrate that an expert evaluation of the clinical symptoms of patients suffering from injuries of the brain may give valuable advice to the surgeons, who are fully occupied with their surgical activities.

Another decisive problem is the question in how far the cooperation of the neurologists may be decisive for the later fate of the patient suffering from an injury of the brain. Everybody who had to consult and to evaluate numerous cases of patients with injuries of the brain years after the incident, knows what it means, if practically nothing is said in the first hospital reports about the course of the clinical picture during the first weeks following the injury of the brain, and if only some single particularly obvious symptoms, such as for instance a hemiplegia, are mentioned. There will hardly be a patient with a brain injury who will not file a request for pension rights at a later time. If we must then more or less rely upon the statements of the patient himself who had lost his memory for the decisive period of time, a certain unfairness is just as unavoidable as the fact that one or the other hysterical case, or individuals eagerly hunting for pension rights, will be granted more than their justified share.

This applies in particular to cases of closed injuries of the head, such as conditions resulting from being buried or damages to the nervous system due to contusion and explosions. In these cases we will frequently observe symptoms where the decision whether we are dealing with an organic or a functional disturbance will be particularly difficult from the beginning on and where only an expert treatment can avoid that functional symptoms develop following an original organic damage which in the final analyses will not permit a separation of these components. It is the particular merit of Stabsarzt (Captain, MC.) Prof. BETZENDAHL to have called attention to these temporary organic symptoms in case of clinical pictures of a pseudo-neurasthenic character.

It is only natural that on his way from the frontline to the home hospital the patient will be treated by different physicians. This fact is particularly unfavorable in the case of patients suffering from injuries of the brain where organic and psychological factors exist simultaneously and where every change in treatment and every different evaluation of the disease of the patient will always be clearly recognized and influence the patient's attitude. I therefore want to direct your attention to the question whether or not it would be worth while to establish an immediate relationship between the special wards for patients suffering from brain injuries in the field hospitals and the same wards in the home hospitals, as is the case with the corresponding special hospitals of the Airforce. In this way a uniform method of evaluation and treatment will be guaranteed which undoubtedly will have a favorable effect on the objective and subjective status of the patient with a brain injury.

Discussion:

WACHSMUTH: Three points of discussion:

1. Trepanation must be made even in the slightest injuries of the brain.

2. All fragments must be completely removed.

3. Should the operation be performed by a frontal approach? Is a localization by X-ray essential?

TOENNIS: I am able to operate a clearly depressed injury of the skull without localization by X-ray. I am not able to do so in case of a missile lodging in the depressed skull.

PEIPER: Suggests consulting otologists to get acquainted with the technique of otology.

GULEKE: An aspirator is absolutely necessary. Speaker is presently engaged in the development of such an apparatus.

FREY: Where should gunshot injuries of the brain be operated? At the place where the first surgeon can be found who is able to perform this operation?

WUTH: At what time should a neurologist be consulted?

1. It is impossible and unnecessary to have a neurologist in every hospital.

2. It is impossible that the consultant neurologist goes to advanced points to cooperate with some surgeon who has a certain preference.

3. Difficulties have been observed in the rear establishments. This is the place where the consultant specialist is needed in order to avoid a repetition of the events of 1918.

I wish to call your attention to the importance of the problem of psychopaths as well as to the forensic evaluation of such cases.

CHRISTUKAT: Patients who once suffered from an injury of the skull later on believe they had an open gunshot injury of the brain, even if no neurological finding was made. The situation is entirely different in case of closed injuries to the skull.

Kurt SCHNEIDER: Is of the opinion that a neurological examination of patients suffering from gunshot injuries of the brain is first of all a matter of the surgeon. A cooperation of the neurologist will not be so valuable with regard to therapy, but it will be appreciated.

WUTH: Psychiatrists will be consulted in order to avoid the confusion of 1918. They should not perform their duties as assistants of the surgeons or as physicians with general duties. Their mission should also not only consist of the collection of scientific material. Their principal mission is to give consulting advice to the Army Surgeon or the Surgeons of Military Districts in all important problems referring to psychologic education of the Armed Forces, problems of psychopaths, and to act as consultant specialists in all matters pertaining to forensic medicine, as well as to take care of the assignments of psychiatrists and neurologists.

Kurt SCHNEIDER: There is no problem of psychopaths during mobile warfare. There will however be numerous cases of gunshot injuries of the brain and of the nervous system for the treatment of which the neurologist may give valuable advice.

Carl SCHNEIDER: The number of secondary diseases can be reduced by the cooperation of the neurologist. The number of hospitals for the treatment of patients suffering from injuries of the brain is insufficient.

Most important sequelae of these injuries are:

1. Postinfectious conditions;

2. Prolapses;

3. Sequelae similar to brain abscesses;

4. Vegetative sequelae.

In case of an early and expert treatment there is the possibility of a reduction of these sequelae. Furthermore there is the possibility of a reduction of the number of epileptic cases. As long as no operation has been performed on the patient suffering from an injury of the brain, his evacuation is relatively simple.

After the operation the patient suffering from an injury of the brain must rest in bed for 3 - 4 weeks.

Sometimes it will be better to not perform an operation immediately, but to allow the patient to rest in bed for 24 hours; his condition will then improve.

It will be hard for the patient to endure an evacuation of 80 - 100km. in an ambulance car. It will be relatively easy for him to endure air evacuation, with the exception of cases where he is exposed to the low pressure of high altitutes.

A primary treatment about 100 km. behind the frontline will essentially improve the result of the entire treatment. Fewer prolapses will occur in case of a carefully performed operation. In all cases of gunshot injuries of the brain where no careful curettage has been made during the primary treatment subsequent prolapses will be observed. It is impossible to establish a special hospital for the treatment of injuries of the brain everywhere.

The course of the clinical picture of a patient suffering from a gunshot injury of the brain should be subdivided into 4 to 5 different phases of treatment in order to facilitate the work of the surgeon.

1. Phase where the patient has not been given any treatment.

2. Phase following the primary operation (with curettage or with a simple trepanation).

3. Actual process of healing of the wounds.

4. Phase following the covering of the wound (by suture, scar-formation).

The surgical treatment should preferably be performed during the second and third phase. During this period of time the patient should remain in surgical wards as far as possible.

During the first and last phase the advice of the neurologist and the psychiatrist should be decisive.

Surgeons perform a very systematic work, but they frequently do not consider the pathological sequelae subsequent to the injury. The value of the different symptoms is not taken into consideration, therefore a cooperation of the neurologist and the psychiatrist is very important in order to avoid late sequelae.

It was the surgeons who showed which cases they should better not treat, (fixed pupils, lesions of transverse incisions).

Serious injuries of the brain stem should not be treated surgically, because of the too high mortality rate. In the homeland the crux of the situation is this: Many patients suffering from injuries of the brain are treated too late by the neurologist and the psychiatrist. They remain in surgical wards for months without being treated by work-therapy. All paralyses should be fixed. Symptoms of insufficiency will be observed.

The third phase (actual process of healing of the wounds) should be completed as soon as possible and the patient should be transferred to a hospital for patients recovering from injuries to the brain (work therapy). A cooperation between surgeons and neurologists in the advanced hospitals should be obtained.

Summary:

WUTH: 1. Problems of evacuation, and organization are not subject to discussion by the consultant specialist.

2. The consultant specialist of an army cannot possibly be kept in a field hospital. He can consult neurologistsand assign them to field hospitals but he must never lose the control over all the establishments under his supervision.

Responsibility for the psychological status of the Armed Forces must be carried by one man.

Sequelae following injuries of the brain should be dealt with in the hospitals in the homeland.

It has been pointed out often enough, that surgeons need to consult psychiatrists and neurologists.

Directions for the treatment of patients suffering from injuries of the skull.

It will be most useful to subdivide gunshot injuries of the brain according to the clinical points of view into the following groups:

I. Gunshot injuries with the bullet passed through the skull.

1. Depressed fractures of the skull caused by gunshot.

a. without an opening of the dura,

b. with opening of the dura and without prolapse
with prolapse.

2. Gunshot injuries of the skull with the bullet lodging inside.

3. Gunshot injuries of the skull with the bullet passed through the affected part.

II. Gunshot injuries affecting the base of the skull.

1. Depressed skull-fractures due to gunshot injuries,

a. without an injury of the dura,

b. with an injury of the dura.

2. Gunshot injuries with the bullet lodging in the base of the skull.

3. Gunshot injuries with the bullet passed through the base of the skull.

All patients with gunshot injuries of the skull should be evacuated as quickly and as carefully as possible to the special wards where a neurologist can be consulted and where treatment can be performed. An exception should be made with those patients who are unable to endure an evacuation due to severe comminuted fractures of the skull due to gunshot injuries. They should only be evacuated to the next main-dressing station or field hospital. In all cases where the general situation renders this impossible, the fresh gunshot injuries of the skull must be treated by the surgeons of the advanced medical establishments.

Under no circumstances may cases which promise success be kept in the advanced medical establishments because of difficulties with regard to evacuation, which will thus miss an early surgical treatment.

In every case those patients must be treated surgically in the advanced medical establishments, who show symptoms indicating danger of life (increase of cerebral pressure). These symptoms are increasing unconsciousness, change of the pupils with regard to their width and reaction, decrease of the pulse rate with subsequent acceleration. The only cause of such cases of an increase of the cerebral pressure within the first 48 hours is arterial hemorrhage which occurs only with depressed skull fractures due to gunshot without prolapse and skull injuries with the bullet lodging in the affected part.

To judge this it will be necessary to:

1. Observe the patient at least for several hours;

2. To find out whether the condition of the patient will improve after an intensive treatment with infusion of glucose, or with remedies to stimulate the peripheral circulatory system.

This indicates clearly that a patient suffering from a gunshot injury of the brain must not be operated immediately after evacuation, but that he has to be put under observation at least for some hours. In principle the 48-hour limit should be adhered to as observation period. Exceptions should be made in cases with a prolapse because their outcome will be fatal anyhow, although the prospects are much worse in those cases.

If at all possible X-rays in two planes should be made before each surgical treatment of gunshot injuries of the skull.

It is recommended that a lumbar puncture (20 ccm.) be performed before the operation in order to reduce the pressure of the spinal fluid.

During the further course the lumbar puncture, which serves to reduce the high cerebral pressure with a cerebral prolapse can bring essential relief, if an increase of the quantity of spinal fluid was the cause.

The object of the primary surgical treatment of the wounds is to:

1. clean the cerebral wound from fragments of the missile, remnants of tissue and germs causing an infection;

2. arrest hemorrhages;

3. avoid secondary infections.

In principle this is achieved by a debridement of the external wound, widening of the bone-gap, aspiration of the wound contents from the brain and careful application of hemostasis. After this, covering the gap in the hard cerebral membrane (closing the gap by pedunculated flaps of galea-periosteum freed laterally) and a tension-less suture of the skull-cap in layers, if necessary by means of flap-plastics. During this operation on the one hand one must assure the most thorough removal of all remnants of tissue from the wound (as the wound will reopen otherwise, eventually with a secondary cerebral prolapse) and on the other hand for a completely tension-less closure of the external wound. To achieve this, sulfonamides can be administered either orally or intravenously. For the elimination of pains local anesthesia with or without the administration of S.E.E. will be applied. If the patient is very restless, Evipan-narcosis can be given.

The cleaning of the cerebral wound is done best by aspiration. If this is impossible there is no other choice than to use the catheter with a syringe or soft curettes or grasping forceps, which must naturally be used as carefully as possible. Most suitable for the arrest of hemorrhages are the silver-clips or coagulation. If this proves to be impractical, pieces of muscule tissue may be sewed in place. In case of sinus-hemorrhages it is recommended to perform a ligature around or sewing in place of pieces of muscule tissue. The best means to arrest hemorrhages of the bone is to apply sterile wax. Every hemorrhage has to be arrested before closing the wound. If the location of the wound suggests a sinus-hemorrhage an interference with the possible place of injury of the sinus should as a measure of prevention be avoided. During the widening of the bone-gap, the fragment lodging in the sinus should be removed first, if the piece of muscule tissue necessary for the closure is already at hand.

The uninjured dura should not be opened in case of new injuries. This may only be done if it is strictly indicated because of an increase of the cerebral pressure due to hemorrhage. This happens very rarely.

In case of apparently superficial gunshot injuries, even with the smallest wounds, a thorough debridement of the wound must be performed. This should be preceded by an X-ray examination if at all possible. An intact lamina externa does not exclude an extensive fracture of the lamina interna. Even the smallest wounds in the skull may perforate and may show serious sequelae as a result of gunshot injuries into the brain.

In case of gunshot injuries of the base of the skull the participation of the accessory sinuses is of particular importance (danger of infection). In this case a curettage of the affected accessory sinus, a thorough and clearly visible exposure of the wound of the dura, the usual debridement of the cerebral wound and thereafter a particularly careful closure of the dura from the accessory sinuses must be made by a pedunculated flap of galea-periosteum. A good drainage from the accessory sinuses has to be provided routinely.

After the operation a period of rest in bed of possibly 4 weeks must be striven for.

In case of an additional meningitis an improvement can be achieved by an operation, if the focus from which the meningitis originated can be eliminated. In addition to the local surgical treatment, lumbar-punctures with a gradual insufflation under evipan-narcosis with the patient in a half-bending position has to be performed. In addition sulfonamides shall be administered as well as drugs stimulating the circulatory system. In case of a progressive encephalitis no improvement can be expected.

All details are contained in the "Directions for the treatment of gunshot injuries of the brain" in the collection "The troop physician", volume 6, J. F. Lehmann edition Munich-Berlin (Richtlinien fuer die Behandlung von Schussverletzungen des Gehirns" in der Sammlung "Der Truppenarzt", Band 6, Verlag J. F. Lehmann, Muenchen - Berlin).

III.

THE TREATMENT OF FRESH WAR WOUNDS BY CAUTERY

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

1. Short survey concerning the development of this method.

Oberfeldarzt (Lt. Col., MC.) Prof. WACHSMUTH

The contradictory opinions of many specialists in this field induced the Army Medical Inspector to prohibit for the time being the application of the cautery method in the field. The Army Medical Inspector now requested the surgeons present at this conference to express their final opinion on this subject.

2. Success and effect of the treatment by cautery.

Stabsarzt (Captain, MC.) POECK

The speaker has reported about the success and the effect of the treatment by cautery. These reports were based on his experiences with 4 000 patients of 1 division treated by this method. Only in 235 cases can an exact survey be given. 7 of these ended fatally. As the principle advantages of this method which POECK does not consider as a substitute but only as a supplement of the surgical treatment the following factors are emphasized by him. No spreading of germs, hyperemia, constant sterility of the instrument, increase of immunity. Damages by decay of protein are of no importance, the same holds true for acidosis. POECK strictly resents the assertion that the crust due to the cautery treatment could have an occlusive effect; he recommends to at least test this method of treatment in some special hospital wards.

Discussion:

ROSTOCK: Equal mortality rates were observed in 400 cases of animal experiments with and without cautery. Within the 6th Army the cautery method has been used in 486 patients, but in only 5 per cent of them there was an improvement recognizable. The method remains valid for the treatment of phlegmons and abscesses as mentioned originally by BIER. Its application is resented for fresh war wounds.

KILLIAN: The figures mentioned by POECK are of no importance, as they are based on observations made in "the area of scatter" (Streuungsbereich). 6 cases of gas gangrene subsequent to cauterization have been observed. The speaker rejects the method.

KRUEGER: Is in favor of the cauterization method only in case of beginning phlegmons and abscesses but not in case of fresh war wounds.

POECK: By the application of the cautery the continuation of an active surgical intervention inside the wound is obtained. The speaker differentiates between a prophylactic and therapeutic application of the cautery.

WACHSMUTH: The problem of using the cautery method can only be discussed as far as its use in case of fresh war wounds is concerned. An accumulation of negative opinions can be observed. The speaker dictated a declaration according to which the specialists present agree with the decision of the Army Medical Inspector to prohibit the application of the cautery method. The method will remain permissible for the treatment of abscesses and phlegmons.

Points of view.

The surgeons present at the Conference East are of the opinion after hearing the lectures of Dr. POECK, that according to the present status of experiences the use of cautery in fresh war wounds is under no circumstances so safe that its application would be permissible in the field.

As far as its application in the field of septic surgery, and in case of abscesses and phlegmons in reserve hospitals is concerned the method will remain permissible in such cases where it is indicated.

The surgeons therefore agree with the decision made by Army Medical Inspector dated 10 January 1942.

IV.

CHEMOTHERAPY OF THE WOUND INFECTIONS

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

Chemotherapy of the wound infections.

Oberstabsarzt (Major, MC.) Prof. ROSTOCK

Chemotherapy of wounds has been known for ages. Every war has changed the old problem and raised it again according to the state of scientific knowledge.

This lecture is not supposed to be an account of the experiences gained up to this date, but it is supposed to be a summary of what we know as a result of our daily practical experiences, and this shall be the basis for a discussion.

With regard to the administration of sulfonamides which are now in the center of interest, it is new that primarily they were not applied locally on the wound but that they were administered to the body in general either in an enteral or parenteral manner and that thus they developed their effect. In addition it is new that some preparations are specific against different kinds of bacteria and the diseases caused by them. The results of a sulfonamide treatment are uncontestable in case of pneumonia, gonorrhea, epidemic meningitis and perhaps in case of erysipelas. However, we do not want to discuss these diseases at this time. This discussion is to be limited to infections of wounds, (tetanus, gas gangrene) and suppurative wound infections.

It is known to us that sulfonamides are ineffective against tetanus. Their effect is disputable in case of gas gangrene. No definite decisions have been made in this respect as yet. This may partly be due to the fact that genuine gas gangrene, which is caused by the three known exitants is not always clearly differentiated from the phlegmon with gas, the symptoms of which are in principle benign.

As regards the treatment of wound infections it is not the enteral or parenteral administration that is presently in the center of interest, but it is the local application. Different opinions have been expressed about the results obtained. BRUNNER even dared to treat contaminated peace time injuries locally with sulfonamides and then sutured them without performing a debridement of the wound. SCHREUSS has given too much praise to the far reaching effects of these remedies. KIRSCHNER and his assistants expressed their doubts about their effect. They have tried to prove by experiments that Iodoform is superior to the sulfonamides in case of a local application on the wounds.

The statements concerning the effect of these remedies are of the utmost importance for our medical standards. In the past one was in the belief that the remedies for the disinfection of the wounds must have a particular effect on the vitality of bacteria and one has arrived at the generally known conclusion that all remedies applied would sooner lead to a decay of the cells than the bacteria lodging therein.

The sulfonamides are said to have a different effect. It has been asserted by HEUBNER that it is only inside the body tissue that the sulfonamides develop the effective substances, the exact nature of which is still unknown. On the other hand it has been asserted that these remedies produce a socalled protective tissue inside the wound. Other scientists are in the belief that the remedies facilitate the phagocytosis of the bacteria. It is of importance to point out that necrosis of the tissue and their decomposition products inside the wound hinder the effect of the drug.

For their practical application it is of basic importance to find out exact details about the efficiency of the sulfonamides. Therefore fundamental research should be given the highest priority. I am able to create the material conditions for such research work in my clinic, if the necessary number of patients will be transferred there and if suitable physicians with serious interest in such research work can be made available.

It will be necessary for the collection of clinical experience that the different kinds of bacteria react in a different way. The preparations have a better effect if they are applied or administered in vivo than in case of an application in vitro (BRUNNER). With regard to their increasing power of resistance against sulfonamides the wound bacteria can be subdivided into the following groups:

Pneumococci
Streptococci
Coli bacteria
Proteus
Pyocyaneus
Staphylococci.

The position of the most important exitant of gas gangrene within these groups is disputable.

If we attempt to find the purpose and the method of clinical experiments the following can be said in general:

The most urgent problem appears to be the examination of the efficiency of the sulfonamides in case of a local application in wounds. Under no circumstances, however, should the surgical treatment of the wound be forgotten in this case. It will always remain the basis of any treatment, also in case of an applied chemotherapy, for necroses in the area of the wound will essentially hinder the effect of sulfonamides. The principle danger of chemotherapy consists in the fact, that it may induce careless physicians to be less thorough during the debridement of the wound, due to a certain confidence in chemotherapy.

Equal series can be created by experiments, in other words exact research work can be done as has been demanded by KIRSCHNER in his controversy with SCHREUSS. In bed-side medicine the opinion of the experienced physician concerning the effect will be decisive.

Secondly the effect of a remedy administered for the organism in general, must be tested. It is highly probable that the efficiency will be inferior to the method of a local application. The application through the general organism might be of a certain importance in case of injuries of the brain, as there exists no limit of liquor of the blood in case of sulfonamides.

During the discussion of the dosage it has been requested to make it dependent upon the concentration of the remedy in the blood (5 - 10 mg.per cent, in serious cases 20 mg.) and upon its excretion in the urine. An exact knowledge of the facts might be necessary for scientific experiments. For a practical application in times of war, however, this criterion will be useless. We will have to search for more simple indications of the dosage.

As in all other cases of administration of sulfonamides a sudden effect for several days must be obtained in case of a local application, and not a regular and continuous effect. After the revision of the wound we will dust the powder into the wound by means of a dust-sprayer (powder-atomizer) or salt-shaker. This will be repeated on the occasion of the next change of the dressing. During the days between the change of dressing the remedy should be administered orally. A parenteral administration will be impossible during the turmoil in war time.

DOMAGK recommends the following method: 5 - 20 grams of Marfanil-Prontalbin-powder should be applied (smeared) into the wound with about the thickness of a back of a knife-blade. If the powder is still dry on the surface of the wound at the time of the next change of dressing, considerably less powder may be applied the next time, or its application may be eliminated completely. 3 - 6 grams of Marfanil-Prontalbin in tablets will be administered during the days between the change of dressings. After 6 - 8 days an interval of about 1 week should be made if possible. If necessary, the same treatment has to be repeated. It will be up to the physician in charge to determine the smallest optimal dosage for each patient.

A similar dosage scheme is effective for the administration of Cibazol and Cibazol-boracic acid powder.

Injuries due to the use of sulfonamides are rare. Slight inconveniences have been observed, such as: nausea, vomiting, cyánosis, diarrhea, tinnitus, and headaches. All these symptoms subside immediately after an interruption of this treatment. In addition scarlet-fever-like and bulleus exanthemae have been observed, furthermore a degeneration of the liver (Icterus) and injuries to the kidneys as well as neuritis. No definite fatal cases have become known hitherto. The treatment of all such injuries consists in an immediate interruption of the administration of these drugs, and under given circumstances in blood-transfusions.

We wish to discuss in short the particularities within the different regions of the body.

Within the urogenital system the efficiency of the sulfonamides is argued about. It is definite, that the sulfonamides are less effective here than in case of ordinary wounds. In case of abdominal gunshot injuries and peritonitis a dusting of the sulfonamide powder into the abdominal cavity and into the wound on the abdominal wall is combined with an oral administration. In case of gunshot injuries of the joints BRUNNER has performed a rinsing of the joint cavities with a 2 - 5 per cent Cibazol solution and has filled the joint with this solution.

In comparison to the efficiency of sulfonamides which still has to be explored, all other remedies are of minor importance only. Numerous different remedies have been recommended. Due to the fact that our stocks are limited, an application of tincture of iodine is in general excluded. SCHREUSS recommended Hexamethylentetramin and urea combined with Rodan. The traumatic "epidemic" of this war offers us an opportunity to test the efficiency of these new remedies for the treatment of wounds in the form of different preparations of sulfonamides. It is our duty to take advantage of this opportunity.

Discussion:

WACHSMUTH: The tests with sulfonamides are still under way. Therefore no definite result has been arrived at as yet.

KILLIAN: Has been designated to perform further critical work in this connection together with DOMAGK (gas gangrene, basic research, and so on).

KRUEGER: Expressed a very favorable opinion on the prophylactic effect of sulfonamides, which is however, based only on clinical observations (gunshot injuries of the brain without meningitis; gunshot injuries of the lungs, without empyema; and so on) (5000 cases).

SAUERBRUCH: Criticizes the primitive opinions concerning the healing of wounds. During World War I one hoped to obtain the same results with Vuzin, Rivanol and so on. These remedies veil the surgical activity and lead the physician to negligence. These methods should, however, be tested very critically and the tests should be up to the surgeons who master the field of general surgery.

KILLIAN: It is our mission to test whether:

1. the clinical course of the wound healing was favorable after the treatment with sulfonamides,

2. a suppuration has occurred simultaneously,

3. it was combined with gas gangrene.

According to KILLIAN's observations on 1339 cases an improvement could be observed only in 18.8 per cent of these cases despite a generous evaluation. The application of sulfonamides in case of gas gangrene is particularly unfavorable because oxygen is consumed. In four cases gas gangrene has been observed. These problems require a careful further study.

FRUEND: Recommends the additional treatment with sulfonamides, due to the insufficient possibility of the debridement of wounds in times of war. He observed 74 cases for 6 - 8 weeks! He is in favor of an early administration of sulfonamides in the highest possible dosage. Up to 8 grams may be administered during the first day. An increased effect of sulfonamides is obtained by a combination with Cebion.

WACHSMUTH: The judgement based on general impressions do not yet allow one to draw final conclusions. It will rather be necessary to continue with a careful examination of the therapy with sulfonamides based on accurately observed individual cases.

KRAUSPE: In general I agree with the statements made by ROSTOCK. - Induced by the physician of our army Generalstabsarzt (Lieut. Gen., MC.) Dr. GUNDERLOCH we have performed a particularly extensive therapy with Mesudin within our army since August 1941, especially in case of gas gangrene. Thus we dispose of a number of observations where this remedy has been applied perorally as well as locally. It has been very suitable in these cases. In spite of this I wish to point out that it is not yet possible to form a final opinion concerning the effect of these preparations. As mentioned above, we have heard some very enthusiastic opinions about the preparation and the therapy, but at several places where partly good results have been reported to us, particularly by surgeons, it has become known to us that no success at all was obtained neither in case of a local nor of a peroral use. It is impossible to survey these statements right from the beginning. In a large number of cases this is due to the fact that in case of gas gangrene we are not dealing with a genuine infection of a definite strain of bacteria, but that actually these are always cases of mixed infections, while the use of the preparations available is always indicated in case of a particular type of germs only. Thus for instance we want to mention the serum against symptomatic anthrax bacteria, which are of minor importance in case of a gas gangrene infection, while the FRAENKEL bacilli and the NOVY bacilli have to be considered first of all. An additional factor is that we have seen so little success in case of a pure application of these preparations that we considered an immediate interruption of their use to be indicated, in order to facilitate an active surgical therapy right from the beginning on. As has been mentioned by ROSTOCK the most important result arrived at was the conclusion that in case of gas gangrene the surgical operation is and will remain the most important factor.

I wish to report in brief only about the microscopic examinations of sulfonamide treatments as I do not yet have the results of bacteriological examinations. It is my impression that in numerous cases a very abundant leukocytosis can be observed. However, this is also true for cases treated in a different manner.

CHRISTUKAT: As far as neurologists are concerned three groups of diseases are of special interest, namely: the poliomyelitis, the different kinds of encephalitis and the different kinds of meningitis. With regard to the first two groups of diseases it should be pointed out that chemotherapy was a failure in their case. In case of meningitis an exception has to be made as far as luetic and tuberculous meningitis are concerned. No effect will occur in case of the first diseases of the two just mentioned and in case of the second disease the general changes are of such a high degree that no effect can be expected any more.

Concerning the different effect of chemo-therapy on the various kinds of cocci it should be said in brief that Eubasin has the best effect on meningococci and pneumococci, while Prontosil and Cibazol should be given preference in case of streptococci.

As has already been pointed out by ROSTOCK, the ability of the blood plasma to dissolve the sulfonamides. is very good. Thus, the drug should in general be introduced into the blood. The level in the spinal fluid will be equal as was observed in examinations with a constant spinal fluid loss. The latter experiments have been performed primarily in Italy.

An intralumbar administration of sulfonamides should under all circumstances be avoided. This is true for all preparations. Everything that has been written hitherto about a possible lack of vitamin B_1 and a corresponding administration of this vitamin is so hypothetical that it is of no practical use. I wish to call your attention once more to the fact that even in case of treating meningitis with sulfonamides the serum treatment and repeated lumbar punctures must never be forgotten. Even besides the sulfonamide therapy this treatment remains the method of choice.

GINS: I wish to make a short contribution to the problem of chemotherapy based on our chemotherapeutic animal experiments. In experiments performed under my supervision we have observed that no definite effect was recognizable for any preparation which we have used. Neither Prontosil nor Prontalbin have shown any characteristic reaction. In case of an administration of Marfanil and Mesudin none of our animals survived the test. The same observation has been made in case of an administration of Sulfanil as well as Siron, the so-called new sulfonamides, which are manufactured by the German Hystier-Factories. With regard to the latter group it can be said in conclusion There are no prospects for a special effect in case of a local application in animal experiments.

Finally new tests were made to find out some more details about Katoxin which has been recommended some time ago with great hopes. Katoxin is a preparation, the effect of which is combined from an oligo-dynamic effect of silver and a protracted effect of oxygen. The first tests which were made by the Katoxin-Company themselves appeared to be absolutely hopeful. Later experiments which were performed by the test-team of the Katoxin-Company right here in the Academy and under my supervision, appeared to be also very hopeful and in addition supplied a very interesting contribution concerning the psychology of animal experiments. As a matter of fact the following observation was made during a series of tests, for which the Katoxin preparation has been used, partly marked with the letter A and partly with the letter D. Curiously enough all animals on which the A preparation was applied have survived the test, while those animals exposed to the D-test died. (Laughter!) It must be emphasized that such things do happen. It was impossible to discover any kind of negligence in connection with the performance of these tests. We have checked on this subject carefully. The suspicion, that somebody could have cheated must therefore be eliminated. I want to cite all of this only as an example of how careful one has to be to obtain definite results. The experiment has shown that Katoxin has no different effect than other sulfonamides.

If we are to make any suggestion we wish to say that it will in general be the same as has been made by the clinicians already: One must always consider the fact that a guinea pig is not the same as a human being. As far as the results of the tests have shown, no injury has to be expected in case of preparations which develop their effect in the tissue. It is therefore worth while to consider whether or not detailed experiments should be made with this preparation. With consideration of our points of view we could not recommend the use of a definite preparation in general, however, we could recommend a clinical test in equal groups and with consideration of the statements made by ROSTOCK. If this is done, than it might possibly be observed that with certain methods of application or with certain groups of sulfonamides a success can be expected on one or the other case, perhaps also with Katoxin. I should advise to include Katoxin in such tests, naturally this should only be done with the point of view that one does not expect too much from these tests right from the start.

Directions concerning chemotherapy of wound infections.

The treatment of war wounds with sulfonamide preparatio against wound infection appears to be successful. At present the following preparations are available in the medical supply depots: Marfanil-Prontalbin-powder, Prontos tablets, Neo-Uleron-Albucid-tablets, Eubasin-tablets, Sulfapyridin-tablets, Cibazol-tablets and Eleudron-tablets.

An outbreak of traumatic tetanus cannot be prevented by these remedies. For this reason tetanus-anti-toxin should be administered as previously.

It is not definite whether gas-gangrene can be prevented by chemotherapeutics. The collection of further experiences in this field is particularly desirable.

During the treatment of war wounds there should first of all be a surgical treatment of the wound, along with a removal of all decaying tissue and an opening of all pockets of the wound. Thereafter the remedy is dusted into the wound in a dosage of 5 - 20 grams, according to the size of the wound. This will be repeated with each change of dressing. Independent of the time of the change of dressings the patient will be given the following quantities of a sulfonamide preparation: per os (if necessary rectally or intravenous): 8 grams during the first day, 6 grams during the 2nd day, 5 grams during the 3rd day, and 4 grams during the 4th to 6th day. The administration of these drugs should be equally divided over the whole day. Thereafter the treatment with these medicaments should be stopped and it should only be started again if indicated. The earlier the treatment will be started, the better will be the prospects for success.

It is recommended that the local treatment be performed with the sulfonamide powders which are available along with an internal administration of such preparations as Albucid, Cibazol, Eleudron, Eubasinum, Globucid (particularly in cases of gas-gangrene), Marfanil-Prontalbin and Prontosil.

If secondary symptoms occur in some rare cases, such as nausea, vomiting, diarrhea, tinnitus, headaches, exzemas on the skin, or icterus, the treatment with these drugs has to be stopped immediately.

V.

E V A C U A T I O N O F T H E W O U N D E D

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

Evacuation of the wounded.

Oberfeldarzt (Lt. Col., MC.) Prof. WACHSMUTH

Gunshot injuries of the extremities have to be treated in such a way that evacuation is possible at any time; that means that a plaster cast with a splint has to be applied or a plaster cast with traction maintained by a wire incorporated in the cast. The application of the extension method is in general rejected for use under field conditions. The use of the KUENTSCHER marrow nail was unanimously rejected for field conditions.

1. Medical indications for evacuation.

The more unfavorable the external conditions for an evacuation are at the place of the surgical treatment (weather conditions, road conditions, means of transportation) the more carefully the medical indication for evacuation must be made. In case of poor evacuation conditions, an evacuation should be made only in case of a military or medical tactical necessity!

An early evacuation has to be avoided if at all possible in case of gunshot injuries of the skull, lungs and the abdomen. As a rule, these patients require 3 weeks of rest in bed after the surgical treatment.

2. Guarantee of the possibility of evacuation at any given time.

In case of unstable field conditions (information should be obtained regularly concerning the tactical situation!) the wounded have to be treated in such a way that they can be evacuated at any given time. As far as gunshot injuries of the extremities are concerned, this means, to desist from an application of the wire-extension method. The plaster of paris cast will therefore be the only means by which the affected limb can be kept at rest. An attempt should be made to obtain a careful primary reduction on the extension-table for plaster casts with a subsequent fixation by means of the combined fenestrated plaster cast with traction maintained by wires incorporated in the cast. An application of the extension method during rest in bed should be considered only under really stationary conditions.

3. Means of transportation.

The most conservative means of transportation is evacuation by air. The primary condition for a good course of the evacuation is the permanent cooperation between the medical establishments of the Army and Airforce. Objections expressed in the beginning of the war against air evacuation in case of certain types of injuries (gunshot injuries of the lungs or of the brain) can be rejected as unfounded. During winter time especially good clothing or equipment for the protection against effects of cold have to be kept available.

The more improvised the ambulance vehicle is, the shorter must be the routes of transportation.

Protective measures against the influence of the weather inside the vehicles (cold, sun, dust and rain) have been planned. During the cold weather periods the vehicles should be equipped, if at all possible, with thermos-bottles, hot bricks, stoves (instruction of the personnel about the danger of carbon monoxide) and blankets. In case of an evacuation on open vehicles (carts, sledges) sufficient straw and hay should be on the vehicles. During cold weather several wounded should be put closely together.

4. Preparatory measures.

a. General.

Sufficient protective clothing against the influence of weather should be kept available, particularly for cold weather periods. Two woolen-head-protectors, 4 blankets should be available for each man, as well as two pairs of woolen gloves of which one pair should be gloves without fingers. Layers of paper should be put under the clothes, the extremities should be protected by straw, rags and furs. A sufficient number of aid-stations and rest-stations should be established.

b. Medical.

1. Fixation.

In case of uncertainty about the duration and route of transport, durable bandages which are able to withstand the moving should be applied.

2. Combating of pain.

No morphine should be administered in case of gunshot injuries of the brain. No opium drugs, no S.E.E. and so on during cold weather! In both cases Luminal will be useful.

3. Support of the circulatory system.

Due to the fact that in principle peripheral failures occur, drugs affecting the periphery are indicated, such as Sympathol, Veritol.

5. Medical measures during evacuation.

a. Repeated check-up examinations during evacuation, at least at all stations. The most frequent complications during evacuation are: hemorrhages, collapse of the circulatory system, fat embolism, strangulation of the limbs caused by too tight bandages or by forgotten tourniquets.

b. During the cold weather periods moist bandages should be renewed, no new bandages should be put over the old ones.

c. The removal of lice infested plaster casts for the purpose of disinfestation should be up to the surgical wards exclusively.

6. Technique of evacuation-dressings.

a. The field transport splint does not serve the purpose of a permanent fixation but in general only as a means of fixation for the time of evacuation from the front lines to the place of the first surgical treatment. It must not be applied too tightly, the boots must not be removed and sufficient cotton must be put underneath the sole of the foot. The supporting belts should not be closed too tightly because of the danger of hyperemia-stasis.

b. Plaster casts.

Satisfactory fixation for evacuation is possible only with a plaster cast in case of surgically treated gunshot fractures and with a combined plaster cast with traction maintained by wire incorporated in the cast in case of gunshot fractures of the thigh.

The plaster casts must be of sufficient size and must be well padded.

In case of gunshot fractures of the upper thigh a plaster cast around the pelvis with a sort of plaster-pants to be applied to the sound side is necessary.

In case of gunshot injuries of the joints the two joints next to the injury should always be included in the plaster cast.

Unpadded plaster casts are prohibited as evacuation dressings. A good padding is the only guarantee of a sufficient supply of blood and at the same time serves as a protection against cold.

c. Position of the limbs.

The usual double right angle position of the upper limbs is not indicated for evacuation because of the large amount of space required. The most favorable position for evacuation is that with a slight abduction of about 40° in a triangular bandage with a frontally slightly elevated upper arm. A true abduction position should be avoided (DESAULT bandage) as it cannot be foreseen how long the first bandage will remain.

In case of gunshot fractures in the distal part of the thigh the abduction should remain limited to the width of the stretcher with consideration of the limited space during the evacuation. In case of gunshot fractures in the proximal part of the thigh fixation has to be made in an abduction position in spite of all difficulties concerning the evacuation, as an abduction position would under all circumstances necessitate an early later change of the plaster cast.

d. Wound dressings.

Moist dressings or dressings with ointment are not indicated for evacuation, particularly not during a cold weather period. Also bandages with cod-liver oil ointment should not be applied because of their disagreeable odor in times of hot weather.

Discussion:

KILLIAN: KUENTSCHER himself has never recommended marrow nailing for gunshot fractures.

VI.

T Y P H U S, W O L H Y N I A F E V E R,
R E L A P S I N G F E V E R.

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

A. Typhus.

1. Variations in the clinical course, clinical prognosis, late damages, subsequent sequelae, Typhus-encephalitis, Weil-Felix reaction, Otto-and Weigl-vaccines, dust from fecal matter of lice. Reko-serum, time of administration. Therapy.

Stabsarzt (Captain, MC.) Prof. BRINKMANN

It is due to the particularities of our activities on the front line that I can base this lecture on actual results of my observations much more than on theoretical knowledge. If one studies the corresponding sections of the literature one will find that not everything contained therein is in accordance with our actual observations, in particular those theories which have been expressed in too short a catch-word style and too epigrammatically.

To start with the catch-word concerning the relative uniformity of the clinical course of the disease it can be said that it does in no way conform to the variety of the various clinical pictures which can be observed during an epidemic of a larger extent.

Thus we know of cases with a short period of incubation which as a rule lasted about 11 days as in the case of an Oberfeldarzt (Lt. Col., MC.) who became infected during his visit of hardly one hour in a PW camp in M. On the other hand we know of other cases with a prolonged period of incubation of more than 21 days, as was observed during an epidemic affecting the personnel of a field hospital at G., which spread from a particularly large and highly lice-infested transport of wounded.

In addition there are cases where the diseases attacked a patient suddenly, as in case of a young physician, who, in the middle of a walk which he had started in perfect health was overcome by the fever to such an extent that he could hardly get back to his billet.

Furthermore there are other cases with distinct prodromal symptoms as was the case with the chief-physician of a permanent PW camp which began with a miserable general feeling, weakness, inclination to giddiness and fainting, lack of appetite and insomnia.

The disease starts as a rule with acute chilling, occasionally even with genuine shaking-chills. The body temperature raises quickly and with slight remissions and after 2 - 3 days reaches its peak and as a rule remains as high as 40°C. for 8 - 10 days. Most of these cases are combined with slight remissions, some single cases, however, may also show some pronounced intermissions. As a rule the fever declines within 1 - 2 days in critical cases; it is seldom that it declines lytically over several days.

It is certain that no such pronounced bradycardia can be observed with typhus as in the case of typhus abdominalis, and as a rule, the pulse rate amounts in the beginning to 100 to 110 but a still less distinctive distance from the temperature curve cannot be overlooked. Therefore, in contrast to a theoretical opinion a certain relative bradycardia must be assumed, at least in the beginning. As a rule a glance at the temperature curve is sufficient for the expert to establish a preliminary diagnosis.

There is quite a number of patients in whose case it is easy to establish a preliminary diagnosis after a mere glance at their so-called typhus appearance: brilliant red face, markedly inflamed conjunctivae. Generally one speaks of the so-called "rabbits eyes". A comparison with a "bull" face is perhaps not very polite but in general expresses the meaning best.

On about the third to fifth day of temperature the exanthema appears suddenly. According to my opinion, the slogan of an "explosive" onset of the exanthema which originated from LIPSCHUETZ is not the most fortunate choice. It would be easier to recognize the slogan of BRAUER about the development of the exanthema "in one phase" which expresses a very short and clear cut differentiation between a gradual occurrence of the roseolae in case of abdominal typhoid: for it the typhus exanthem sometimes needs even more than 24 hours for its complete development and spreading, in some single cases even days, it develops nevertheless in a continuous sequence.

One of its principal characteristics is its extensive variability of tender, pale-red maculae, which can easily be removed by pressure, which however, reappear quickly again and which develop into larger slightly elevated papulous spots which then can no longer be removed by pressure and which are not so bright red as typhoid roseolae, but which are of a dirty brown-red and frequently show small hemorrhagic centers.

The exanthem is not equally distinct in all cases, frequently this is the case only after a certain lateral illumination particularly of the area of the flanks. Some authors recommend the use of flash-lights for the detection of the finest exanthem.

Definitely there is also quite a number of cases taking their course without an exanthem. PLETNEW has observed up to 7 per cent of such cases of typhus without an exanthem during the well-known Moscow epidemic; other authors figure on 14, even up to 18 to 20 per cent. These figures appear somewhat high to me, however, as during large scale epidemics one will always have to take quite a number of abortive diseases into consideration, which are treated as outpatients, such cases of typhus sine exanthemata are only natural.

In the environment surrounding typhus patients one will always find quite a number of people who actually feel somewhat uncomfortable but who, as hardened soldiers, did not pay any particular attention to that and yet in their case the Weil-Felix reaction shows a positive reaction of 1/400 sometimes even 1/800. During the epidemic which had broken out among the personnel of a field hospital as mentioned before the commanding medical officer and his surgeon observed a certain feebleness in themselves, a lack of power to concentrate as well as a hitherto unknown clumsiness during office work and the chief medical officer noticed particular difficulties when writing, as well as a certain trembling in his hand writing. When they had made the Weil-Felix test on themselves later on, it turned out positive in both cases.

Such cases of typhus exanthematicus ambulatorius are difficult to diagnose even for the expert. Their epidemiological importance, however, is not small, and this has been pointed out only recently again by SEIFFERT in his attempt to establish an index about an epidemic spreading of typhus.

It should be pointed out by the way that such abortive cases of typhus have been observed frequently since the introduction of protective immunization. It is not rare, that the typical exanthem is absent in those cases where protective immunization has been made. The course is considerably shortened, the Weil-Felix reaction frequently is only slightly positive and even negative in some cases, so that occasionally one can get in considerable difficulties with the differential diagnosis of the corresponding case and its classification.

As regards the Weil-Felix reaction it should be pointed out, that it is positive relatively late in case of an early diagnosis, but that according to the experiences made it increases distinctly as a rule. At the beginning non-specific agglutination on typhoid, paratyphoid and FLEXNER dysentery can be observed. One should not be induced to establish false diagnoses as happens repeatedly. If the reaction is made frequently enough so that curves can be worked out therefrom, one will obtain an increasing one for the Weil-Felix reaction and a decreasing one for the non-specific agglutination. The crossing of the two curves is extremely characteristic for typhus but unfortunately it is generally not well enough known.

There are, however, cases in which the Weil-Felix reaction remains negative during the actual disease in spite of frequent repetitions- and even this is not generally known - as we have observed in the case of a Captain of the Medical Corps whose reaction turned positive only during the reconvalescent period.

The most remarkable symptom of typhus exanthem is its hemorrhagic respectively petechial change. According to our opinion it might be considered as, so to speak, an external manifestation of equal sensory changes in the central nervous system, therefore particularly in the brain. We are in the

belief that as such they represent a very good indication for the severity of the anatomical changes in the brain, in short for the severity of the respective individual case, but that they also represent an indication of the effectivity of therapeutic measures.

As is well known the excitants of typhus settle in the area of the capillaries and pre-capillaries. The endothelial cells swell with a simultaneously hyaline and necrotic change of the most internal layer of the wall. The capillary wall swells. However, only small sectors of the vessel will be affected. Fibrin exudates will then arise in the surrounding parts, combined with lymphocytic and plasmacell infiltrations and by gradually increasing adventitial and peradventitial exuberant growth of cells to a ball-shaped or spindle shaped attached swelling, the so-called little typhus knots. In the brain and in the spinal fluid these are located exactly in the grey substance. In addition there is prolific hyperplasia of the neuroglia, edema of the brain and the meninges and finally hemorrhages. Most affected are the stem of the brain, floor of the fourth ventricle, pons and medulla oblongata.

According to NICOL it appears justified to compare typhus with periarteriitis nodosa and for this reason he correctly considers the disease of the smallest vessels characteristic for typhoid as arteriolitis respectively periarteriolitis nodosa.

On the other hand a similarity with epidemic encephalitis is marked and therefore one should not be surprised if one finds neurological changes which remind one of the picture of the ECONOMOS-encephalitis lethargica. The typical location of the small typhus knots permits the establishment of characteristic neurological syndromes as were well demonstrated by Prof. von STOCKERT. The extent of the anatomical processes easily explains the severity of the psychic changes which may even develop into a catatonic clinical picture as was described by MUNK. By thrombotic processes and hemorrhages, hemiphlegia may occasionally arise, which in particularly serious cases can be irreversible to a certain degree in contrast to the other changes caused by typhus encephalitis.

The opticus, facialis and particularly the acousticus nerve are affected among the cranial nerves. Giddiness, difficulties in hearing and tinnitus can last a long time, even during reconvalescence.

The peripheral nervous system is also affected, particularly in the area of the lower extremities and to a larger extent than in case of polyneuritis, while paralyses of the nerves occur more easily in the area of the upper extremities, particularly in the area of the ulnaris.

The fact that the small typhus knots are most frequently located in the area of the floor of the fourth ventricle explains the various vegetative disturbances, but in particular it also explains the sequelae following an injury

of the vasomotoric center. In this connection the characteristic decrease of the systolic blood pressure and the diminution of the amplitude of the blood pressure resulting therefrom must be mentioned first of all.

It is probable that the marked decrease of weight of the typhus patients can be explained by anatomical changes in the area of the vegetative centers even if the clinical picture does not appear to be too serious in the beginning.

The sequelae can be explained particularly by the centrally influenced changes of the vessels, as they can be observed in serious cases in the form of a tendency to decubitus, gangrene of the fingers and toes, over the hands and feet and to extensive necroses of cartilaginous parts as of the ears, nose and larynx.

Additional dreaded complications are phlegmons, furunculosis, parotitis, otitis media and especially more or less extensive pneumoniae, which are sometimes generalized, but more often localized and occasionally even suppurative due to a superinfection with streptococci, in some single cases even gangrene of the lungs.

A diseased heart is an additional important factor which must not be overlooked. Especially from there the spreading of small typhus knots starts and results in a disseminated interstitial myocarditis of the right as well as of the left heart, particularly below the endocardium. If the conduction system is affected, various functional disturbances result therefrom. Even in case of a progressive reconvalescence there are - as we have seen in the case of two young physicians - occasionally quite unexpected more subita with a secondary arrest of the heart action. BREDNOW has observed distinct disturbances of the heart and circulation even 1 - 2 years after the patient had recovered from typhus.

A short while ago WALTHER described secondary diseases subsequent to typhus which were marked by renewed increases of temperature after the temperature had already returned to normal combined with a renewed swelling of the spleen, occasional urticaria, slight neuritic symptoms, and in one case painful effusion into a joint. He mentioned that SCHITTENHELM too had observed such short lasting "secondary fever". We saw similar cases ourselves but we believed that the slight increases of temperature were damages due to a too early transport of the patient. I am convinced that in the case of typhus there are recrudesces similar as with abdominal typhoid, but on the other hand I could observe a genuine relapse with renewed exanthemata after a period of about 14 days without fever. As far as the prognosis of the single cases is concerned we have to say that it depends on the age of the patient, which can easily be understood because of the pronounced changes of the vessels in case of typhus. On the average one expects a 50 per cent mortality rate in case of patients over 40 years of age. This about corresponds with our own observations.

This high mortality rate is considerably reduced by the protective immunizations which are now given to more people. This immunization does not eliminate the contracting of the disease, but it protects according to our experiences - and this seems to be of special importance to me - older people against an otherwise threatening tragic course.

We have at our disposal practically only experiences made with the WEIGL vaccine.

That it is possible to improve the prognosis with older people sometimes by therapeutic measures will be discussed in detail later on when I shall talk about the treatment.

According to experiences the kidneys as a rule are more or less affected in case of typhus. A prognosis with those patients who a short time before had suffered from a typical field nephritis cannot be made very clear.

The same holds true in case of all patients who had previously suffered other severe infections like scarlet fever or diphtheria, as is not rare according to our experiences.

It is natural that the general state of vitality has to be considered when making a prognosis.

As a result of all these above mentioned complications and sequelae after typhus, the prognosis will become worse.

Generally it can be said that typhus will take a more severe course with people who like ours have not been infected and immunized to a certain degree because they did not have repeated typhus epidemics through past generations. This point of view was already proven during World War I and is now substantiated again by the experiences of this war.

As regards the aforementioned, one must not overlook that all epidemics have distinct peaks of morbidity and mortality, the same holds true for typhus. Russian physicians told me that they observed peaks of morbidity between November/December, December and January and finally February and March, and furthermore an increased mortality toward the end of March.

In this connection the observation of the Russian physicians may be of interest, who observed that the power of resistance of their captured comrades had been reduced considerably by the marked loss of strength. While in former times they considered a period of immunity of 20 years after typhus, they state, that according to their present experiences immunity lasts about 5 years only. They frequently observed relapses of typhus. One Russian prisoner who was captured during the war had typhus three times and the last time with a fatal ending.

Concerning the therapy of typhus we have to state that we are still in a testing phase. However, it is my belief, that the latest observations give us certain hope that we are at least on the right way. With the at first enthusiastically accepted method of giving transfusions with the blood of reconvalescents we could only insure a certain recovery for the respective patient. We certainly could not have expected more, as the experience with the serum of convalescents laid down in literature did, according to my knowledge, not promise much success. The intramuscular injections of the patient's own blood, as has been proposed by Polish physicians were not even tried at our clinic. As I have observed, Eubasin has found various reviews in the literature. In my opinion, however, it has the advantage of eliminating the otherwise dreaded complications of the lungs to a certain extent.

Also the treatment with Atebrine and Plasmochin inaugurated by Second Lieut. Medical Corps MEERENDONK did not fulfil all the expectations of the author. He is now expecting better results in case of a simultaneous administration of calcium and his point of view is based on the idea of having Atebrine produce a specific effect on the rickettsia circulating in the blood and to have calcium produce an effect which tightens the walls of the vessels and has a generally inhibiting effect on inflammation. As a matter of fact he was in earlier days of that disease able to prove a reduction of the blood calcium level to 6 and later on to 8 mg per cent. Tetanic symptoms in case of typhus have been known for a long time. Dr. VAN MEERENDONK is now using the following procedure: 3 times per day 0.1 gram Atebrine per os, in addition 10 - 20 cubic centimeters calcium gluconicum 20 per cent which quantity may in serious cases be increased to 40 cubic centimeters. If calcium gluconicum is not available at the moment, the corresponding quantity of 10 per cent calcium chloratum can be administered. No fatal cases were observed by VAN MEERENDONK among 60 patients treated that way, some of which were even of advanced age and this fact seems to be particularly important to me. The exanthem was less extensive according to his observations and also became less hemorrhagic and petechial, a fact which appears to be of particular significance to me. In addition no more cases of decubitus and very few cases with complications of the lungs occurred. The blood pressure did not decrease so markedly since that time, at any rate it never decreased below 100 mm. Hg.

Quite similar to this a considerable reduction of the blood calcium level was observed at the clinic of Prof. VEIL at Jena. At this clinic a treatment of the typhus patients with T-C-6 (Calciumthiosulphat "Schering") 10 cubic centimeters was started as the most important anti-allergic remedy; in particular, however, A-T-10 was used for the treatment which is also an anti-allergic remedy similar to vitamin, stimulating the calcium level. The daily dose

amounted to 1 teaspoonful, in serious cases as much as 1 tablespoonful with a simultaneous intramuscular administration of Cortiron. This is a therapy therefore, which is based on comparable observations and appropriate conclusions and intentions. Also in this case the course of the disease was considerably milder and the duration was shortened, the exanthem has been less extensive and less hemorrhagic and the central nervous symptoms were less dramatic. If one does not consider the case of a 72 years old swim-master, the VEIL clinic had only one fatal case among 25 patients which corresponds to a mortality rate of 4 per cent.

If the small number of patients on which the observations of VAN MEERENDONK and VEIL are based are not misleading, the treatment with high doses of calcium appears to be promising and commendable. The question whether or not Atebrine should be administered simultaneously can only be decided by further observations in the sense of a comparable therapy.

Similar facts also apply to the administration of Prostigmin, as recommended by Prof. von STOCKERT. Due to the lack of a sufficient amount of clinical material, however, I am not yet in a position to form a final opinion on the subject. Prof. von STOCKERT expects Prostigmin to have a central tonic effect on the entire muscular system as well as on the cardiac muscles and he therefore assumes that it also counteracts any threatening weakness of the cardiac circulation.

In spite of everything said above one should according to my opinion be much more concerned with keeping the patient at rest in the sense of the sedative treatment according to HAUSMANN, than is generally the case. Physicians who have suffered from this disease have reported to me how sensitive they have been against effects of light and noises.

One of them could hardly come to an end with his praising comments on the convenient effect of a morphine injection, after all previous remedies had failed to produce a favorable effect.

In contrast to the statements of HAUSMANN I do not wish to desist from an early administration of remedies supporting the cardiac circulatory system, especially of Strophantin. In every other respect, however, we should similar to the methods applied by the Russians hold back with every officiousness (polypragmasy) no matter how good the intentions in this respect are and the nursing personnel should be trained for a most careful observation of the patients, while our younger colleagues must be informed in an expert observation of the pulse and an early prevention of the threatening collaps of the circulatory system.

2. Variations in the clinical course, clinical prognosis, late damages, subsequent sequelae, Typhus-encephalitis, Weil-Felix reaction, Otto and Weigl-vaccines, dust from fecal matter of lice. Reko-serum, time of administration. Therapy.

Oberarzt (1st Lieut., MC.) Dozent SCHULZE

A considerable portion (about 30 percent) of all typhus patients who have received treatment in the area under my control, among them physicians, stated that they have never had lice. Even if we take if for granted that only a small portion of these patients have convinced themselves by a daily examination of their clothing that they were free of parasites, the fact will remain that typhus occurs also without a contamination of lice bites with infected fecal matter of lice.

In a typhus hospital for Russian PW's physicians and medical personnel had to wear tight protective clothing and rubber gloves. In spite of this protective measure, however, the majority were infected with the exception of those who used to wear captured Russian gas-masks when entering the highly infected rooms.

Only in very rare cases does the infectious material penetrate through small superficial wounds; more frequently the infection is caused by a contact with the mucous membranes, in which case the conjunctiva appear to be particularly exposed to danger because of the possibility of embrocation.

The frequent conjunctivitis among physicians and personnel in the typhus institutes of Lemberg and Cracow appears to be explainable by this fact.

Furthermore numerous individual observations and experiences gathered from typhus institutes emphasize this mode of infection.

In this connection one must also consider the possibility of an infection by droplets discharged by coughing typhus patients. This point of view appears more justified if one thinks of the frequent complications of the lungs as a specific disease, which might be proven by the resistance toward Eubasin treatment. Even though PLETTNEW has made the observation that an orthodox pope did not fall ill in spite of his kissing of dying people, this does by no means affect this conception.

For diagnostic purposes the Weil-Felix reaction has proved just as useful in case of a correct evaluation as the rickettsia agglutination mentioned by WEIGL. It must be noted in this connection that there is no relationship between the level of the titer and the seriousness of the disease or the content of protective bodies in the serum.

Apart from a larger specificity the difference consists first of all in the fact that the rickettsia agglutination according to WEIGL does on occasion not only rise at an earlier time and reaches higher values during the course of the disease and seldom decreases, but it remains also for a prolonged period of time.

The rapid reaction according to the method of HALLMANN is in general parallel to the Weil-Felix reaction.

The agglutination with Proteus x 19 will seldom turn out positive before the 5th or 6th day, in exceptional cases even only at the end of the 2nd week. Ordinarily the reaction grows increasingly stronger and then decreases again after a couple of weeks.

If the statements made above represent the rule, exceptions will occur on occasion which should not be overlooked and ought to be mentioned as well.

1. Some single clinically clear cases of typhus did not show an agglutination according to Weil-Felix in spite of several repetitions of the test.

2. Agglutination of Proteus x 19 has been observed in case of injuries due to cold, diarrhea, angina and icterus (also with an increasing titer), without clinical symptoms of typhus being noticeable.

3. Patients who definitely suffered from typhus did not show an increase of the titer level in the course of the disease and cases where the level remained constant were just as well observed as cases where it decreased.

As regards the level of the titer itself, it should be pointed out that with equal clinical material differences were observed in the various test laboratories (1:200, 1:400, 1:1200 or 1:1000 and 1:400) which will be unavoidable until one succeeds in producing constant agglutinable Proteus x 19 strains.

An analogous relationship exists between people vaccinated with the serum mentioned by WEIGL and the Weil-Felix reaction.

If it is in general impossible to establish diagnoses based exclusively on the result of one single reaction this realization will gain even more importance in this case.

Due to the insufficient acquaintance of many physicians with this clinical picture a final diagnosis "typhus" after a single result of 1:100 or 1:200 is an impractibility, leads to confusion and aggravates the evaluation of clinical and therapeutic results in addition to the diagnosis.

There will hardly be any other disease except typhus where the value of a good prophylaxis for the treatment becomes so evident:

Out of 250 patients treated with the WEIGL vaccination serum 4 died - 1.6 per cent.

Out of 1250 patients without previous treatment with the WEIGL vaccination serum 240 died - 19.2 per cent.

In this connection it must be pointed out that only one patient out of the four who died had received his vaccination in due time, while in the case of the remaining three patients the immunization had only been started.

A protective immunization in due time offers an almost absolute protection against a fatal issue in case of an infection. Even a vaccination during the period of incubation does not have an unfavorable effect on the further clinical course of the disease. At the time when the disease has reached its peak, however, a continuation of the vaccination appears to me to be not quite harmless. One patient whose case became known to me died 48 hours after such a procedure. In every other respect it can be said that the clinical course of those patients who had received one or two vaccinations was a much milder one than of those who were not vaccinated at all.

The clinical course of the disease was a much milder one with patients who had been vaccinated previously. In particular I wish to point out that the serious disturbances of the central nervous system hardly ever occurred, the circulatory system was less exposed to danger, the exanthema was frequently of a short duration only and the febrile period was frequently shorter and the temperatures as such were lower. Naturally, the remaining usual therapeutic measures must not be neglected.

Unless methodical or financial factors are of significance, there is no reason why one should change and use OTTO-vaccination-serum. I do not have the necessary experience based on a sufficient number of cases observed to form an opinion on this serum.

I wish to report about our observations on almost 2000 typhus patients without discussing the practical experiences and those based on animal experiments concerning the treatment of typhus which are contained in the literature.

During the <u>treatment of typhus patients</u> the supportive therapy of the circulatory system is most important besides the usual external treatment and the special diet along with which a sufficient amount of liquid must be administered.

As regards the administration of <u>Strophantin</u>, Camphor and remedies effecting the central nervous system it must

be pointed out that one should not wait until the blood pressure decreases or the pulse rate increases.

As the recovery from fever will take a considerable length of time, particularly with the serious cases, and as this involves certain hazards for the circulatory system, cardiac remedies should be administered also during this period.

Since there are all kinds of transitional changes in case of typhus, beginning with death caused by acute myocarditis to vagus cardiac inhibition which frequently are of such degree that an intensive supportive treatment of the circulatory system can be life-saving, one must not desist from the administration of remedies supporting the cardiac and circulatory system, and also not from those affecting the central nervous system.

With conditions of excitement and motor unrest Scopolamin-Eucodal-Echotonin (S.E.E.) has proven useful everywhere. An attempt should be made, however, to get along with more harmless remedies first.

Sulfonamides (be 1034, Eubasin, Prontosil, Cibazol) have not shown a specific effect even when administered in large doses. Even in case of typhus pneumonia, which can be observed frequently, Eubasin had no convincing effect. As mentioned in the beginning typhus pneumonia is possibly a specific disease of the lungs, a fact which might explain this failure.

The attempt to obtain an improvement by small doses of Pyramidon (five times 0.1 grams per day) did not meet the expectations. No reduction of the temperature could be observed, the general condition of the patient remained unchanged.

Novalgin was administered with 25 patients suffering from typhus in doses of 5 cc. intramuscularly once or twice per day. In every case a critical decrease of the temperature accompanied by profound perspiration occurred. No improvement of the excitement could be achieved as well as no improvement of the intake of food could be observed. Almost all of the patients felt worse after the decrease of temperature, suffered from a severe feeling of illness and rejected any food. Occasionally an aggravation of the pulse rate was observed. About 8-12 hours after the administration of this remedy the temperature rose to the previous height and the further clinical course could under no circumstances be considered as improved.

Mercury preparations (Salyrgan)are useless and without influence on the clinical course of the disease.

The administration of Vitamin K and P did in no case show a convincing effect, but it must be pointed out that the number of cases observed is small. An essential improvement or innovation can hardly be expected from this remedy.

Lumbar punctures are of no diagnostic or therapeutic value.

The hospital reports available are not sufficient for a definite evaluation of a grape sugar therapy (40 cc. of a 25 per cent solution injected intravenously).

Furthermore the question of treatment with calcium will remain open. Russian physicians like to use this treatment because of its vaso-constricting effect.

The results of the treatment with serum of convalescents and the value of this therapy is not quite clear as no alternate, comparable therapy was applied everywhere. In any case the results are not convincing.

In Cholm, blood was taken from convalescent patients on the 8th to the 10th day after defervescence. This blood was defibrinated by whipping and was left alone over night. The serum was obtained after sedimentation and was injected intramuscularly (30-50 cc.) without any further addition.

18 patients were treated this way, out of which 11 died, with 4 no influence on the further clinical course of the disease could be observed while an improvement of the general condition could be noticed with 3 patients.

The evaluations made in the reserve hospital at Cracow are not based on objective findings, but one "has the impression that the injection of the serum has a favorable effect particularly as later on it was administered in doses of 40-50 cc. 2 to 3 times. The feeling of giddiness of the patients disappeared, headaches vanished entirely.

The small number of patients treated with convalescent serum at Lemberg also does not permit one to form a final opinion although at this place alternating methods were applied without selecting the patients. Out of 18 patients who had not received convalescent serum 3 died while of 8 patients treated with convalescent serum 1 died.

Although our observations do not permit us to draw final conclusions, they will in any case justify a further use of convalescent serum. More impressive results can surely be obtained if it is used earlier.

Supplementary to what has been said on page 72 concerning the collection of medical experiences in the war it can be stated that the withdrawal of blood from convalescent patients may take place 8-12 days after the decrease of the temperature. When this procedure was used in the hospitals of Cholm, Cracow and Lemberg, no harmful effects were ever observed.

If we survey our therapeutic experiences we can consider it as a positive result that the majority of drugs mentioned did not fulfill our requirements and that we are still far from a specific therapy.

3. Disinfestation, lice-powder, infection by fecal matter of lice. Is disinfection necessary in addition to disinfestation?

Oberstabsarzt (Major, MC.) Dozent EYER.

The methods of disinfestation in areas contaminated or endangered by typhus have to be directed in such a manner that the transmitters of typhus, the body louse, as well as the excitant of typhus, the rickettsia prowazeki can be destroyed with certainty. Every method which shows gaps in this regard, has to be rejected, as it indicates security where there is none. This holds true for the majority of all chemical means of delousing, especially gas- respectively vaporiform means of delousing which can be obtained in the free trade. The fact, that an efficient means of delousing is not also a disinfectant is overlooked quite frequently.

Typhus, contracted by body-lice, is an intestinal disease during the course of which a large number of infectious rickettsia are excreted, which, enveloped in small particles of fecal matter have a great resistance against gas or vaporiform agents. The ability of the fecal matter of lice ot disintegrate easily, aggravates the danger originating therefrom to a large extent. As it cannot be doubted, that the epidemic spreading of typhus depends principally on the existance of live-lice, it can be proven on the other hand, that the origin of some, at first single cases of typhus can be traced back to infection by dusty fecal matter of lice. The old Polish epidemiologists tell quite a story about the importance of the epidemiology of typhus as regards the trade with clothes which in the eastern areas had formerly been exclusively in the hands of Jews.

According to our experiences up to now the old procedure of a sensible use of dry heat has shown the best results, in as far as one takes care that the delousing establishments do not have more work to do as they can actually perform. It is essential, that the heat produced will affect the items which are to be deloused every-where and that it is available in the right temperature quickly and for a sufficiently long period of time. The mistake made most frequently is that the delousing-chambers are packed too tightly with clothes and thus the delousing procedure becomes ineffective. An additional mistake, which is based more on the construction of the establishment than on the management, is the unequal distribution of the available heat. The temperature is limited: the lowest temperature which will kill lice, nits and rickettsias in the appointed time has to be considered, the upper limit of the temperature depends on how much heat the items to be deloused can stand. The simple rule: 90°C for 90 minutes is justified, if the items to be deloused can stand it. The heat-technicians, who have mainly to be concerned with these matters, should have gained enough experience during the past 2½ years of war to be able to solve this problem.

Articles which will not stand a disinfestation with hot air must be disinfested with chemical agents. Among these chemical agents, Cresol, which has been made soluble in water by some emulgent was the only one proving useful in the long run. The use of lotions containing Cresol for the delousing of the human bodies is commended.

The disinfestation of rooms from lice in typhus areas is difficult or practically impossible in these days. A skillfully applied disinfection by scrubbing with Cresol-preparations is always indicated for those places where it is possible.

Another problem which has not yet been solved is that of the delousing of wounded, particularly of those with plaster casts. Also in this case the treatment with hot air appears to promise success, as it can be produced for instance in an appropriate hot air box of the necessary dimensions. The previous insertion of a sprayed stimulant for human parasites (Pyrethrin) is recommended.

The disinfection of the patient suffering from typhus following the disinfestation of his equipment must if at all possible be performed prior to the hospitalization in the special ward for infectious diseases. A regular disinfection after certain intervals of time will not be necessary, but a disinfection at the end of the treatment should be considered.

Considering the high sensitivity of typhus agents against liquid chemicals the problem, which kind of disinfectants should be applied, is of no importance, on the other hand, the availability of raw materials plays an important part.

As regards preventive measures against infestation with lice, I only made experiments with Cresol and Phenol preparations. First of all a suitable method of application was sought. Ointments and powder were taken into consideration which could create an atmosphere of the respective disinfectant on the surface of the skin. The question, how long this atmosphere will remain is the principal problem. By experiments performed on myself I made the experience, that neither powder nor ointments are satisfactory. It was found that after the application of Cresol ointment or Cresol powder the characterisitic odor of Cresol could not be observed after 7 hours had passed since the entire amount of Cresol applied on the skin was dissolved in the skin and had penetrated into the organism. If these drugs were regularly administered to the skin one soon was faced with symptoms of a genuine poisoning.

Cresol powder was manufactured during World War I, but it was not accepted for general use. Samples, sent to the field units lately had no success with soldiers strongly infested with lice. There are reports that a

new preparation composed of powdered tobacco and Cresol derivatives was successful in a PW camp where Russians were detained. I do not think that this messy substance will become popular. It was not possible to gather a personal experience with phtalic acid preparations.

4. The Exanthematic Typhus occurring in this War as compared to that observed from 1914 to 1918.

Oberstabsarzt (Major, MC.) Prof. GRUBER:

The following statements are based on the results of 65 post mortem examinations within the district of the XIth corps and on the examination of cardiac walls of 17 other patients who died in the clinic of Oberarzt (1st Lieut.MC.) Prof. Dr. Werner SCHMIDT. Furthermore notes written by Prof. Dr. Werner SCHMIDT and Oberarzt (1st Lieut.MC.) Dr. KOEBERLE were used.

As a principle it must be stated that no essential difference can be observed between the manifestation of exanthematic typhus during World War I and this war. If one regards the reports of CEELEN, JARISCH, Georg HERZOG, DAWYDOWSKIE and NICOL, one will find even the minor details of what we observed with the post mortem examinations during this winter. The material available to us was much more extensive and in addition a considerably larger number of medical officers was concerned with that matter, some of whom studied this disease for the first time. It is only natural that observations were made which were liable to surprise an observer who for comparison used only the classical picture of the findings of the exanthematic typhus which became familiar to us during World War I.

The classical sign of the exanthematic typhus in the tissues is and will always be the so-called exanthematic typhus nodule which is a more or less well defined nodule consisting principally of inflammatory products and a focal accumulation of cells attached to the small blood vessels, particularly to those of the central nervous system and the skin. These discontinuous cell foci, which do not always appear as nodules but sometimes may be rather stretched out, sheathing the vessels like sleeves, usually enclose altered parts of the endothelium, thrombotic contents of blood vessels, increased perithelial cellular elements and infiltrated migrating cells. Recently, however, HUECK made the correct reference that nodules with merely adventitial cell proliferations occur in addition to quite insignificant exudations and with almost no injuries of the vascular walls. Here, the formation of small granulatoma occurs. I agree with HUECK, if he is opposed in this sense to the frequently used comparison with the picture exhibited by the vascular tissues in cases of periarteritis nodosa. Even if findings similar to

those of periarteritis nodosa are occasionally seen they can by no means be considered as a rule. I have not yet been able to make such an observation, myself. Moreover various organs are not equally affected by the occurrence of such nodules during exanthematic typhus, first of all the distribution varies with the organs. In the central nervous system, particularly in the grey parts of the medulla oblongata and of the brain stem one succeeds best in searching for these characteristic nodules. The search for nodules in the cardiac muscle is less successful. Secondly, the gliogenous structure of the supporting tissue of the central nervous system makes a participation of the gliogenous cell production possible in the formation of nodules. This, of course, is entirely absent in the skin, the heart, etc. Thus, the usually more compact structure of the cerebral and spinal nodules may be explained. On the other hand loose lymphocytoid infiltrations are frequently seen in the skin along large precapillary and capillary, arterial and venous stretches of the subpapillary vascular network, in addition to the typical nodules. These too, are coat-like accumulations of cells, within which one is not always able to prove swollen or congested parts of the endothelium. Thus, the examination of the skin of patients who died from exanthematic typhus, infrequently shows the typical nodules of FRAENKEL,-not even in serial sections - but rather diffuse, non-characteristic lymphocytoid infiltrations around the smallest vessels of the superficial layers of the corium. As to this the suggestion to make sure the diagnosis of the exanthematic typhus by histological examination of excised parts of the skin seems to me not so successful in practical cases as was originally promised by the observations of EUGEN FRAENKEL. some time ago. However, conditions may be favorable with early excised exanthematic parts of the skin of patients while alive. If conditions are very favorable one may be able to diagnose the exanthematic typhus from excised parts of the skin, this, however, is not always certain.

The fact that on the basis of their experience the clinical physicians did not consider the involvement of the heart in exanthematic typhus as being of particular importance during World War I gave rise to the examination histo-pathologically of various cardiac alterations. In recent times these efforts could be further extended. They confirmed the occurrence of exanthematic typhus nodules in the vascular system of the heart. These nodules, however, are often very loose and frequently one tried in vain to find them, while an often only very slight and focus-like distributed interstitial myocarditis between intact muscular areas was found by me in every cardiac muscle of the exanthematic typhus

patients which was examined. In these cases these are no leukocyte infiltrations but stretched lymphocytoid and plasma-cellular infiltrations which are attached to the capillaries between the muscular fibers and which of course may be spindle-shaped accumulations when the interstitium is wide. From these various stages of transition loose vaguely delimited forms of nodules originate. Repeatedly more delimited infiltrations similar to nodules were found in the borderline area of the muscular system and the subendocardial or subpericardial supporting tissue, such as the terminal area of the papillary muscles. Occasionally this principally spotty interstitial myocarditis is exessively pronounced. In contrast to this one usually searches in vain for more pronounced symptoms of degeneration of the cardiac muscle itself. Usually there is no waxy swelling, no clodded decay, and no infiltration by fatty droplets. This does not exclude that spots of fatty muscular degeneration occur, or the rarely observed delimited decay of muscles with an enormous lymphocytoid infiltration surrounding it subsequent to an inflammatory thrombotic occlusion of a very small branch of the coronary artery.

It is a remarkable fact that this interstitial myocarditis can be traced by the clinical electrocardiograph. If, however, many findings are compared one sees that the curves are made rather carelessly and are not put in a system and moreover, that the pathological pictures are quite reversible. This experience was reported by the consulting medical specialist of my Army District, Oberstabsarzt (Major, MC.) Professor Dr. SCHOEN. Nevertheless a transitory cardiac involvement in the whole picture of the severe circulatory disorders of the patients suffering from exanthematic typhus must not be underestimated, even if one has to admit that the early typical drop of the blood pressure of these patients might be of a central origin, or that it was even found with patients whose cardiac muscles revealed only very slight myocarditic alterations during the post mortem examination. A cardiac involvement has always to be regarded as serious, since in the course of the exanthematic typhus a sudden and unexpected death sometimes occurs, which according to HERZOG suggests a death due to a diphtheritic heart failure, or which may happen with the clinical picture of the coronary occlusion. Werner MEYER gave me a report of his personal experience of a most disturbing stenocardiac attac occurring during the first period of recovery and not showing the typical electrocardiographic picture of myocardial infarction. But these cases are also singular. The previous experience and the electrocardiograms show that the myocarditis disappears and is cured. The experience made with the hearts of people having suffered from typhus shortly before or previously shows whether scars of the structure of the myocardiac syncytiums develop, which I would not consider as probable.

Endocarditis was not frequently observed as a sign of the petechial fever. They hardly occur primarily with the valves. But it has been found that an auricular, ven-

tricular endocarditis and an endocarditis of the chords must be taken into account, a continuation of a myocardial inflammatory infiltration which may lead to a thrombo-endocarditis. More or less extended sequelae of embolism of the lungs, formation of embolic foci in the brain, and even sudden death due to cerebral embolism are as possible as necroses in the area of the extremities from the same causes. In addition one must bear in mind that peripheral thromboses caused by a periarteritis or by a periphlebitic alteration of large vessels may occur with all their serious consequences for the organs concerned. The occasional occurrence of bronchial, gastro-intestinal, renal and muscular hemorrhages is thus explained. Furthermore, I want to mention that I found no large petechial purpuralike hemorrhages with the material available to me for post mortem examination.

Moreover, it should not be omitted that the kidneys too are usually involved showing a interstitial focal inflammation, even if there are no obvious clinical symptoms. The small foci are linked to capillary and pre-capillary blood vessels, sometimes even to the interlobular ramifications of the arcuate vessels. They may occur as characteristic nodules with a swelling of their endothelium, usually, however, it can be shown that they are paravascular, lymphocytoid accumulations not affecting the vascular lumen. The same small foci are also found in the cortical area. A focal glomerulo-nephritis was never observed by me, though it alledgedly occurrs.

The experimental pathology of the exanthematic typhus showed how important the enormous toxicity of the causative virus is. The sometimes occurring extensive alterations of the liver may probably be caused by this property of the virus. Werner SCHMIDT reports that during an exanthematic typhus he observed very often the occurrence of an icterus. In the old literature reports are given of a degeneration of the liver with a cell desquamation in the capillary area of the portal vein. In one of our cases we found not so much a degenerative impairment of the liver as a hepatitis with an intracapillary increase of migrating cells and macrophages similar to what is occasionally seen during scarlet fever. No large autopsy experience is published yet on this matter.

At last it is generally stressed that in addition to the typical vascular nodules due to typhus the occurrence of loose, less characteristic, lymphocytoid infiltrations of the mesenchymal supporting tissue of different organs must be taken into account more than before. In the central nervous system the specific sharply defined foci prevail which are the typical nodules of the exanthematic typhus. However, one must remember, that the distribution of the virus throughout the body and the formation of such nodules is extended over a period of several weeks, so that besides fully developed small foci one also meets very incomplete foci and even capillaries with a distinctly altered swollen endothelium, cell desquamation, stasis or even thrombosis, and an edema of the adjacent vascular zone without a nodular

reaction. Thus the findings made on the brain and the spinal cord are more varied than one may have expected at first.

Nevertheless the histological examination of the medulla oblongata, the brain and the cardiac muscle offer such clear histological results that the anatomical diagnosis of exanthematic typhus can be made with certainty: If during accommodation, attention is paid to all these signs the diagnosis is even possible, if the clinical picture is veiled or disturbed by a simultaneous disease of a different origin. In mild cases the histological examination of the heart alone is not sufficient nor can a decisive diagnosis be made by microscopic inspection of small pieces of the skin. In addition to the general toxic effect of the infection the alterations in the bulbar portion of the medulla oblongata must be considered as the usual cause of death. It was hinted above that disorders of the cardiac circulation must also be considered; finally the local results of a disturbed distribution of the blood or secondary infections frequently play a fatal part, even if the central danger of the acute exanthematic typhus seems to be banned.

Literature.

BENDA: Histology of Petechial Exanthema. Wartime Conference of Pathologists Berlin 1916, p. 43.

CEELEN: Anatomy of Exanthematic Typhus. Ergebn.d. allg.Pathol.und patholog.Anatomie d.Menschen und der Tiere. 19:1 Abt. S.307, 1919

CEELEN: Anatomy of the Internal Organs During Exanthematic Typhus. Hdb.d.aerztl.Erfahrungen im Weltkrieg. Bd.8:Path.Anat.S.127; 1921

CEELEN: Histological Findings During Exanthematic Typhus Berlin Klin.Wochenschr.1916: Nr. 20

CEELEN: Projection of Exanthematic Typhus Preparations. Kriegspatholog.Tagung Berlin 1916, S. 14 (Wartime Conference of Pathologists).

DAWYDOWSKIE: Pathological Anatomy and Pathology of Exanthematic Typhus. Erg.d.allg.Pathol.and Pathol.Anatomie d.Menschen u.d.Tiere 20: 2. Abtlg. S. 723; 1924.

FRAENKEL,Eugen: Pathol.Anatom.Findings during Exanthematic Typhus. Muench.Med.Wochenschr. 1914; S.1534.

GRUBER: Dtsch.mil.aerztl.Zeitschr. 1916; H.19/20, S. 402

GRUBER: Cardiac Findings During Exanthematic Typhus. Zeitschr.f.Kreislaufforschung 34; 1942.

HERZOG,Georg: Pathology of Exanthematic Typhus. Zbl.f.allg.Pathologie und patholog.Anatomie 30; S. 97; 1918.

HUECK: Importance of Histology for the Diagnosis of the Exanthematic Typhus. Leipziger Med. Gesellsch. 25. 11. 1941. Klin.Wo.1942;S.262.

JARISCH: Cerebral Alterations During Exanthematic Typhus. Dtsch.Arch.f.Klin.Med.1926,H.3-9.

MUNK, J: Clinical Studies in Exanthematic Typhus. Ztschr. f.klin.Med.82; H. 5 and 6.

NICOL: Pathol.and Anat.Studies in Exanthematic Typhus. Beitr.z.allg.Pathol.a.z.pathol.Anat. 65; H. 1, 1919.

RANDERATH: Pathol.Anat.of Exanthematic Typhus.Lecture in the Institute of Hygiene in Warsaw. 21. January 1941, Med.Klin. 1941; Nr. 17 and 18.

SCHITTENHELM: Exanthematic Typhus. Handb.d.Inneren Medizin. 3. Aufl. 1. Band, S. 965.

Discussion:

BOGENDOERFER: Prolonged transportation of the patient has a very disadvantageous effect upon the progress of the exanthematic typhus. Therefore, it is not always desirable to admit all typhus patients to a common hospital in the rear. 3 days after the beginning of the continuous high fever transfer from field hospitals to special hospitals in the rear should be made only under special conditions. In field hospitals and even in casualty receiving stations small typhus wards should be organized from where the patients may be transferred to a special hospital after defervescence.

HOLM: Since a long period of transport is dangerous for the patients, particularly when they are exposed to cold, it is necessary not to use only the big typhus hospitals in the rear, but to attach typhus wards to the advanced hospitals.

GUTZEIT: Transportation has a detrimental effect on all highly infectious febrile diseases. This is the case with the exanthematic typhus and with dysentery. Even the most careful transportation should therefore be avoided, whenever the tactical situation permits it. Hence, in all hospitals and even in the advanced medical stations infectious disease departments should be set up which must have enough room available so that patients suffering from exanthematic typhus can be kept there until at least 8 days after their defervescence. A premature transfer has an impairing effect even after defeverescence. From there the patients must be transferred to hospitals for convalescent patients until they have completely recovered.

BOGENDOERFER asked about details on the decrease of the sodium chloride in the blood and suggests a diet rich in sodium chloride for patients suffering from exanthematic typhus.

BERG: The importance of the occurrence of a deficient chloride state during exanthematic typhus is demonstrated by the therapy with repeated NaCl infusions to which free Cl ions were added (before use the clorine water was freshly prepared and titrated iodometrically) employed by DANIELOPOLU during World War I, before the hypochloremia was investigated. At that time this procedure was considered as a decisive improvement of the almost fatal outlook for the untreated hypertoxic cases. This therapy aims at a control of the cloropenia and we may expect from it that it improves the blood circulation during infectious diseases (WEIL's icterus etc.) and presumedly also during exanthematic typhus in the same favorable way as during other chloroprivic conditions.

KAUFMANN: Disorders of the sodium chloride metabolism are also suggested by symptoms similar to diabetes insipidus which appear towards the end of the fever period and disappear after 4 to 6 weeks. Inoculation during the incubation period reduced such a period. The further progress of the disease, however, is favorable.

GUTZEIT: It is necessary to come to an agreement as to which therapy should be applied to the circulation. In addition to a certain myocardial damage which is detectable by electrocardiographic examination only towards the end of the period of fervescence, or even after defeverescence, but which clinically is not infrequently indicated early by a diffuse dilatation of the heart, a peripheral and a central insufficiency of the blood circulation is found. Hence, it is required to administer strophantin, glucose and sympatol at an early time, or veritol or veriazol, since a hypotonia is usually present. The centrally stimulating analeptics cardiazol and cormed should only be administered when there is a serious danger.

HOLM: Recommends the use of calcium too ,(to constrict the blood vessels, to influence the vegetative nervous system and, as a result, the blood circulation.)

GUTZEIT: The clinical diagnosis must not depend on the serological diagnosis but efforts should be made to confirm the former by serological tests. A low WEIL-FELIX titer (about 1 : 100) excludes an exanthematic typhus just as little, as a high titer (1 : 800, 1 : 1000) confirms an exanthematic typhus. In areas of epidemics, abortive, latent and very slight cases of exanthematic typhus occur even with people who do not live there continually (German soldiers), and they are not detected by clinical examination. High agglutination titers may be found with these, although they are not suffering from exanthematic typhus at the time of examination. Hence, during exanthematic typhus the agglutination shows the same behavior as during all other infectious diseases. Therefore, the diagnosis of exanthematic typhus must be ascertained by clinical examination as was repeatedly requested for dysentery in this war.

The numerous high Weil-Felix agglutination titers found with our men in the area of epidemics without pathological symptoms being present can only have two causes. Either there is a real non-manifest exanthematic typhus - which is likely - as with many such patients the rickettsia agglutination is positive too, or there are genuine proteus X 19 infections heretofore unknown to the clinical physicians, which is possible since so many cases of intestinal impairment due to dysentery occur. At home investigations are being made which are concerned with the frequency of occurrence of the Weil-Felix titer in blood samples which were incidentally sent in for Wassermann's and Widal's reaction. Amongst 4000 such tests performed prior to the middle of November 1941 not one single positive Weil-Felix agglutination was found by MESSERSCHMIDT in Hannover. We are still waiting for the other results.

KATSCH: During the Spanish epidemic of exanthematic typhus a very high percentage of typhus Ebert agglutination was observed in the first days (with people who were not immunized against typhoid fever), before the Weil-Felix reaction became positive. This shows clearly that no diagnosis should be made exclusively on the basis of agglutination titers.

HOLM: wonders whether conclusions as to the outlook can be drawn from the value of the Weil-Felix titer.

SCHULZE: No such prognosis is possible.

HOLM: asks what the results are of electrocardiographic records made during exanthematic typhus.

GUTZEIT: The electrocardiograms are not so much required for an early diagnosis, as for the diagnosis of a delayed myocardiac impairment during exanthematic typhus. Most of the alterations occur only during the second half of the period of fervescence. To estimate the fitness for service the electrocardiograms are indispensable.

KATSCH: Is the development of necroses during exanthematic typhus enhanced by frostbites?

GUTZEIT: The formation of a necrosis during typhus is frequently caused by the combined effect of pressure, cold, and circulatory disorders. A large number of necroses, however, was not observed. In addition to the necroses of the tips several extended necroses of the soft parts were observed (some of them on the thigh, the lumbar region, etc.). Disorders of the peripheral vascularisation by thromboses and embolism occurred frequently, but not regularly. The disturbance of the peripheral vascularisation due to typical impairments of the vessels is sometimes sufficient to cause necrosis.

HOLM: asks what the sick rate is of the immurized and non-immunized people.

SCHULZE: According to WEIGL the sick rate is also reduced by the immunization.

GUTZEIT: reports the possibility to make an eventual early diagnosis by the histological examination of an excised roseola.

GUTZEIT: The opinion on the effect of serum obtained from convalescent patients varies greatly. Its supply caused often difficulties. Research in this line must be continued. To recognize its value exactly comparable investigations of alternating series must be performed in the same hospital. The same was hitherto valid for the blood of convalescent patients. Since in exanthematic typhus the Wassermann reaction may be positive late into the period of recovery, it is not required to make a Wassermann reaction of the donor's blood prior to a blood transfusion from a convalescent patient.

BRINKMANN, VOIGT and BOGENDOERFER are doubtful as to the efficiency of the serum.

HOLM reports of favorable experiences.

VOIGT suggests to use Russians not as serum donors.

DOLMEN: As to the favorable effects expected from blood transfusions during exanthematic typhus attention is directed to the results of the experimental cultivation of the viri. If the virus is fixed in the cells no influence of antibodies on the virus can be observed. Therefore, if the exanthematic typhus has become manifest no influence can be expected from blood transfusions, whereas improvements may be observed as long as the virus invades the blood thus enabling neutralisation.

GUTZEIT: As to the method of obtaining convalescent serum no unfavorable experiences were made in the hospitals. A blood transfusion from a presumedly healthy Spaniard 3 days before he himself fell sick with typhus released an exanthematic typhus in the man who received the blood.

KAUFFMANN: reports of the therapy with hyperthermic bathes according to LAMPERT; evidently they have a favorable effect upon the blood circulation and considerably reduce the seizures of excitation.

KAUFFMANN recommends small doses of luminal (4 to 5 tablets of 0.015 Gr. daily) as a therapy against the fits of excitation.

VOIGT disapproves the excessive use of narcotics. They impair the respiratory center. He also reports of good results obtained by the administration of small doses of luminal throughout the entire day. If during serious fits of excitability narcotics cannot be avoided, the administration of scopolamin-ephetonin-eucodal is advisable.

SCHULZE: During an epidemic, besides temporary variations of virulence local variations also occurred. With a constant material of patients in my hospital the death rate was:

from October to December 1941	27.7 per cent
from January to 28 Feb. 1942	7 per cent
from March to 1 April 1942	25.0 per cent

Definite differences of the seriousness of disease within the same area, time and unit were observed in two different hospitals where patients were admitted from the same unit which was assigned to guard various PW Camps at various places.

HOLM: In the area of the 9th Corps the death rate was low at the beginning (2 per cent) but it was gradually increased in the course of the winter (in the second half of April it amounted to about 12 per cent).

VOIGT: The so called petechial form of the exanthematic typhus takes a particularly unfavorable course. This is the type of exanthematic typhus in which a hemorrhagic exanthem is present from the beginning on. Almost all of these cases are fatal.

GUTZEIT: In the early stage it is hardly possible to give a prognosis on the outcome of exanthematic typhus. The lethality depends not only on the age and the locally

and temporarily varying virulence of the rickettsiae, but also an many other factors (transport, medical care, blood circulation, etc.). Therefore, the value or failure of a therapy can only be decided when the two factors of therapy are given in the same hospital and are compared with each other. This is also valid for the hyperthermic baths used in Ostrow, the more so as the lethality as compared to other hospitals was considerably diminished - January and February 1941 (2 per cent)was increased again in March to the death rate of other hospitals. The difference of mortality between the hospitals Warsaw II and Ostrow in the months of January and February range above the expected incidental difference.

GINS asks how many infections were caused by lice dirt.

ZEISS warns against a premature publication of the results of the experiments concerned with infection by lice dirt and powdered lice dirt.

SCHMIDT read a report of Oberstabsarzt (Major, MC.) ELLER on the infection with exanthematic typhus where no lice dirt was found. Reference was made to the fact that such occurrences play no part for the majority of infections occurring in the Army.

HABS the first principle should always be that delousing controls the exanthematic typhus. Near the front line delousing with hot air is sufficient.

KLOSE: Hydrocyanid acid failed when used in PW Camps.

VIERTHALER: It is certain that infections caused by lice dirt occur in PW Camps and are very likely there, particularly when straw and wood shavings are used as beds. A continuous education of the PW's to cleanliness and a constant delousing abolish the danger of infestation.

MUGROWSKI: In concentration camps treatment with hydrocyanid acid was satisfactory.

BIELING believes that in hospitals a constant disinfection is advisable, as very good results were obtained by it.

Does tobacco-extract prevent the infestation with lice? It appears that for use as a delousing drug mitigal has the same effect as the Russian K. soap. Delousing is the principle factor of the struggle against exanthematic typhus. Even if there are other possibilities of infection, delousing is the most successful preventive measure against exanthematic typhus.

WOHLFEIL is of the opinion that prophylaxis from lice is more important.

CLAUBERG reports of a procedure of delousing by a flow of hot air according to a new device which reduces the period required to kill the lice to 5 minutes. The heretofore valid rules for delousing could be modified

so that only 20 to 30 minutes are requested for one single delousing. An elaborate technical scheme of this procedure will be drawn up in the near future.

SCHREIBER: The problem of a prophylactic administration of lice powder was solved by the manufacture of the Russla-lice powder. The previously used Cresol preparations are disapproved as they irritate the skin or fail against lice. By an appropriate delousing with hot air the rickettsia are killed with certainty. The danger of infection by lice dirt must not be taken too seriously, if there are no large quantities of it. If hydrocyanid acid is disapproved completely, a successful disinfestation of the PW Camps cannot be guaranteed.

RODENWALD recommends examining by experiments the old method of interring the garments except for a small end which should be left outside.

LAUCHE: From the reports of the consulting medical officers and the inquiries it can be recognized that particularly the following problems are not cleared up yet and remain doubtful:

1) Is the exanthema of the typhus histologically so specific that the diagnosis of an exanthematic typhus can be made with certainty from a histologic examination of excised roseolae, as DIETRICH asserted.

2) Which organs, respectively which parts of organs should be examined histologically if it is desired to find typical granules with the utmost possible certainty.

3) Which is the final cause of death in exanthematic typhus?

4) Does the exanthematic typhus take a fatal course in spite of protective immunization?

From the reports available to me it is evident that

ad 1. the exanthem, or the skin nodules often are not specific enough. This is my personal opinion.

ad.2. According to most of the statements I think it is best to recommend the examination of the floor of the 4th ventricle, first of all of the area of the olivary bodies and secondly the heart. When death occurs, the nodules of the skin are usually no longer characteristic, or they have vanished. Concerning the occurrence of the gliogenous nodules during exanthematic typhus, according to a verbal communication of HALLERVORDEN, the statements of DAWIDOWSKIE may be most reliable. According to these the formation of the nodules begins in the first week

of disease (in one case they were fully developed on the 8th day). In the third week the process attains its culminating point, particularly on the 16th, 17th and 18th day. In the fourth week a decrease is observed, but the process still continues until the 5th or 6th week. In the medulla oblongata the process becomes prominent on the 5th or 6th day of disease and it persists longer here than in the cerebral cortex, evidently not being finished by the 5th or 6th week of disease. Other statements are principally in accordance with these. According to them fresh nodules are found simultaneously with older regressing nodules. As to the specific properties of the exanthematic typhus nodules of the central nervous system it must be said that the Japanese encephalitis, the St.Louis encephalitis, and the indigenous encephalitis described by PETTE may show the same type of nodules. All these types are implied by PETTE in the term Panencephalitis. However, these diseases differ from each other serologically. (Upon my request these statements were subsequently written down by HALLERVORDEN).

The myocarditis is often diffuse and in my opinion it cannot always be distinguished from a myocarditis caused by another disease.

ad 3. According to the available reports death occurs as a result of the exanthematic typhus itself in one half of the cases and it must be regarded as the consequence of central circulatory disorders which are often increased by the simultaneous occurrence of myocarditis. In the other half of cases complications, and above all infectious diseases with a generally diminished physical resistance are the final cause of death (broncho-pneumoniae, oral infections such as diphtheria, tonsillitis, parotitis and sinusitis). The problem of how the necrosis develops is not yet solved, whether it be due to local causes such as decubitus, or to embolism, or to a specific impairment of the vascular walls, or of a central nervous origin.

ad 4. Only 7 cases of death by exanthematic typhus in spite of immunization were hitherto reported to our collecting center. In two of these cases the immunization had not yet been completed, an other case was a 53 year old medical officer with a cornnary sclerosis, a further case was that of a medical orderly who on account of an erroneous diagnosis had received a Salvarsan injection. In a further case typical symptoms of exanthematic typhus appeared on the 5th day after the last inoculation, so that it must be assumed that at the time of inoculation the patient already was infected. Only one case permitted no proper explanation.

ROESSLE refers to the diagnosis of the exanthematic typhus. The dermal roseolae are not constant; they are irregular but specific when the disease is fully developed.

SIEGMUND: The histological findings of the dermal roseolae depend upon how long they are present. The necrotic alterations given by FRAENKEL occur only during a certain stage of development.

Under war conditions no diagnosis of the exanthematic typhus can be made from the roseolae.

KOCH: The exanthema of the exanthematic typhus cannot always be distinguished from other exanthems. The exanthema of the exanthematic typhus shows a varying histological structure.

GRUBER: Gives one more suggestion as to the clinical diagnosis of the exanthematic typhus. Why should skin particles be excised, if the Weil-Felix reaction is relatively reliable. One must not forget that a wound is caused by such an excision and that any complication of the exanthematic typhus should be avoided from well understood medical reasons. I am not surprised at all that the medical officers dislike to excise skin particles of their patients suffering from exanthematic typhus.

LETTERER: Diagnosis from skin excision is not certain to 100 per cent. The development of the nodules depends on the time, that means on the time at which it was excised.

KOCH: The best method of locating nodules at post mortem is to investigate the brain in the area of the olivary bodies and in the upper part of the rhomboid fossa.

SIEGMUND: The examination of the brain stem (olivary bodies and rhomboid fossa) is the best method of a rapid diagnosis.

DORMANS suggests to remove for an anatomic diagnosis the cardiac muscle and the testicles in addition to the brain and to send them for a histological diagnosis to a pathologic laboratory (since in the cases occurring in the 6th Army the heart and the testicles regularly showed positive findings).

RANDERATH stresses the frequent occurrence of a pronounced hemorrhagic glomerulo-nephritis during exanthematic typhus. It is possible that they are incidental complications occurring at a time when war nephritis is frequent. Reference is, however, made to these findings, since this glomerulo-nephritis occurring during exanthematic typhus was never diagnosed by clinical examination, apparently because during exanthematic typhus no hypertonia occurs on account of a circulatory impairment, or because slight increases of the blood pressure which from the same reasons range below the normal values. In Russia a diffuse glomerulo-nephritis is seen in nearly 25 per cent of the cases of exanthematic typhus.

Hygienic Directions for the Prophylaxis of the Exanthematic Typhus.

The basis of any campaign against the exanthematic typhus is to exterminate the body lice.

1. The epidemic distribution of the exanthematic typhus depends principally on the occurrence of living body lice.

2. The development of exanthematic typhus is exclusively based upon infestation by dirt. (lice dirt).

3. The exanthematic typhus of the body lice is an intestinal disease in the course of which a large amount of highly virulent typhus germs are excreted. The fact that lice dirt is easily reduced to powder may increase its dangerous effects.

4. The disinfecting measures in areas infested or threatened by exanthematic typhus must be directed in such a manner that the body lice which are the carrier of the germs causing exanthematic typhus and, if possible, also the germs of this disease, the Rickettsia Prowazeki, are destroyed with certainty. Hereby it must be considered that an efficient disinfesting preparation is only exceptionally a good disinfectant. The best preparation for disinfestation is the hydrocyanid acid; but it is no disinfectant, because it is not able to kill the germs. Nevertheless, for practical reasons, use is made of this compound. The same is valid for the mixed gas ventox-tritox. In hospital trains the use of sulphuric acid may be continued for the routine delousing for the time being.

5. The hot air delousing procedure meets the requirements set up above, provided that the garments and objects for delousing are hung up loosely and then are sufficiently heated. As a rule 90 degrees centigrade for at least 90 minutes are sufficient. Vaporous steam has a good disinfesting and disinfecting effect, if it is used properly. Leather goods and furs, however, cannot be exposed to it. The same applies to gas sheets and gas masks.

6. Objects which will be spoiled by treatment with hot air had to be treated with chemicals. Cresol made water-soluble by an emulgator maintained its value. To delouse the body the use of a cleansing solution to which 2½ cresol is added is recommended.

7. The delousing of compartments by gases is successful only if the rooms are sufficiently sealed. (The use of hydrocyanid acid is only premissable by trained personnel supervised by a responsible foreman). Straw couches and similar objects have to be burnd after use. Instead of the gas disinfection a disinfection by scrubbing the furniture, the walls and the floors to the level of 1,50 meters with a preparation of 2½ per cent cresol is advisable.

8. Louse infected bandages applied for the fixation of bones, particularly all plaster bandages can only be changed by medical officers with a surgical training.

b) Trench Fever (Wolhynian Fever)

Lecture by Oberstabsarzt (Major, MC.) Prof. BOGENDOERFER:

Differences as opposed to the experience of World War I,
Measures against it.
Therapy.

As is known, the disease is characterized

1. by a periodical fever,
2. by a neuralgic-rheumatic syndrome.

To speak of the disorders of temperature first, the following must be mentioned: There are most varied forms of the progress of the fever. Its characteristic feature is almost always its periodicity. As with malaria and with recurrent fever, periods of defervescence alternate with periods of fever. In the one type a prolonged period of defervescence is opposed to a short period of fever, or to a single deflection; in the other type, however, we found periods of defervescence and periods of fever of approximately the same length.

As was known from World War I, we also saw to principal types of fever:

1. the paroxysmal fever which drops immediately afterwards (paroxysmal type),
2. the undulating form (undulating type).

These two forms, however, can also be intermingled, so that at first no characteristic temperature curve seems to be present, and the diagnosis of Trench fever is made through the other clinical symptoms.

Amongst our patients those with the undulating curves prevail. Then non-characteristic temperature curves follow. About one fifth showed the isolated high deflections of the five day fever.

The deflections may be very transitory. In a field hospital where 120 patients suffering from trench fever were simultaneously present, I noticed that according to their temperature curves a great number of the patients seemed to be free of fever, when the fever was measured twice within 24 hours as usual. The two hourly measurement of the fever, in some cases made even at night, showed that a rise of temperature to even 39°C. was much more frequent, than was apprehended by only two measurements within 24 hours. The periodical fever may be very transitory. Upon myself I observed that within 3 hours

the temperature rose to 39.6°C. and returned to normal again.

For the diagnosis of trench fever, therefore a continuous, at least two-hourly, measurement seems absolutly necessary to me, all the more so, as for the substatiation of the diagnosis very few objective data are available.

I mention this with a particular regard of the tracing of the responsible germs in the blood. In our army it was not possible even once to trace the Rickettsia quintana in the blood smear or in the thick drop. In our two bacteriological field laboratories and in the various field hospitals innumerable thick drops were examined and even in clinically unmistakable cases no formations were found, which could be regarded as the germs causing the five day fever even if only a moderate scepticism was applied. If this is the result of technical mistakes, I am afraid that these will occur elsewhere in the same way, at least under field conditions.

No observations or data are available, which give information on the incubation period, which according to the experimental experience allegedly lasts 14 to 60 days. In two equal cases where two men came from hygienically incontestable surroundings the disease set in within 9 days; from this observation may be deduced that here the incubation period was 8 days.

Prodromal symptoms are rare. According to our observations the onset is acute. Shivering and headaches are the first symptomes.

The rheumatic-neuralgic pains appear later, and they may consist of muscular as well as of osseous and articular pains of a very considerable degree. The most frequent type of pains are the wellknown tibial pains; but the complaints of pains in the bones of the forearm are just as numerous. A tenderness of the calcaneus is as frequent as of the sacral and the spinal bone.

Of the musculature the calves are particularly affected. I also observed a pronounced painfulness of the abdominal muscles.

The nerve trunks and the nerve points are frequently sensitive to pressure; but no atrophy of the musculature was observed though a particular attention was paid to it. However, we recurrently saw disorders of sensation, particularly hyperesthesias, most frequently of the thigh.

The general status is very often disturbed to a remarkably small degree only; the appetite is usually excellent. In a field hospital which was exclusively occupied by patients suffering from trench fever, weighings were regularly made and without any exceptions a sometimes tremendous weight increase of the patients was observed.

Not much can be reported of changes of the inner organs. In very few cases - I believe not more than five - cardiac disorders occurred such as a subjectively disturbing tachycardia. It is likely that this is a toxic myocardial impairment.

As to the digestive organs a frequent occurrence of diarrhea was noticed. As intestinal disorders are very frequent in the Eastern countries, it is most difficult to decide whether there is a causal relation between these and the trench fever. Several times we saw seizures of pains in the right iliac region similar to appendicitis, without this being present.

In some cases the splenic region is sensitive to pressure. But a distinctly enlarged spleen, was only found in about one fifth of our patients. No enlargement of the liver was observed.

As regards the urinary organs we occasionally found a febrile albuminuria, rarely a cylindruria. The diazoreaction was constantly negative.

No skin symptoms were remarked. We never observed an exanthema or a herpes labialis.

The progress of the disease may vary considerably. The cases in which the fever shows short moderatly high deflections, represent a light form of the disease. The number of attacks is sometimes very small. A case is known to me with only one single high attack of fever exceeding 39°C., which was followed by three smaller seizures of pyrexia at intervals of 5 days, whereupon the disease was apparently terminated. Most of the cases of the paroxysmal type are over after 6 attacks of fever. On the days where there is no fever the patients may be completely free from complaints and fit for duties. But those may be exceptional cases.

The general health is more impaired by the prolonged febrile periods of the undulating form which was considerably more frequently observed. In the majority of cases, however, here too the fever disappears after 4 weeks and a quick recovery sets in.

It is well known that some cases of this disease persist for a very long time. I refer to the literature where a report is given on a case which persisted over 19 months. I believe that abortive cases occur not infrequently.

On the basis of his experience in World War I, SCHITTENHELM mentioned a "[illegible] fever without any fever".

I believe too that the frequently occurring pathological conditions of strange osseous and muscular pains without fever must be attributed to trench fever, but only when the periodically varying rheumatic-neuralgic symptom complex is present throughout several weeks. It seems to be remarkable that trench fever apparently occurs more frequently with the older men than with the

youngest age groups. In the above mentioned field hospital which was occupied only by patients suffering from five day fever my attention was attracted first by the great number of non-commissioned officers among the patients. An accurate classification showed that only 3 men out of the 120 patients of this hospital were younger than 23 years. Although they belonged to a division with a normal average age which had even received fresh men of the youngest age groups. Furthermore it was found that the comparatively smallest group of the five day fever patients consisted of infantry men. These were usually soldiers of units further in the rear. Many gunners, men of supply units, members of the vetrinary companies and similar units were amongst them. Therefore one should not apply the term "trench fever".

I am of the opinion that the prognosis is favorable. Nevertheless, the accumulated occurrence of trench fever may cause such considerable losses of the units that measures against this dissase must be taken not only for individual reasons of treatment.

The clothes louse is reputedly responsible for the infection with trench fever and its distribution. I do not know whether this is true. But I never saw a man suffering from this disease who had not had lice during the time of infection. The extermination of lice, therefore, belongs to the principal measure to be taken.

Concerning the treatment of the trench fever no experience is available of a successful therapy. I am bound to agree with SCHITTENHELM, who asserts, on the basis of the experience of World War I, that there is no specific therapy of the neuralgic fever. Frequent attempts with Fuadin were made. In one of our station hospitals where a small number of medical officers and nurses had fallen sick with the five day fever, fuadin was used, and one believed that there its use results in a success. In other hospitals, particularly in our special trench fever hospital, no certain and convincing results were obtained with the same therapy. Neosalvarsan (neo-arsphenanine) was also employed. In some cases the fever disappeared after two injections, in others it persisted. Antineurolgics and pyramidon usually relieve the pains. This, however, is no causal therapy. The varying reaction of the patients towards the therapeutic application of heat is remarkable. Some of them welcome it, some of them reject it decidedly as increasing the pain. According to our experience the treatment can only be symptomatic. The drugs must be selected individually. The disease disappears also without any therapy.

As to its name I want to mention that the term "Wolhynian fever" may be justified for historical reasons but otherwise it hardly means anything.

The term five day fever is misleading because it suggests a fever persisting throughtout five days. The term given to it by SCHITTENHELM seems to me the most correct: Febris neuralgica paroxysmalis sive undulans, or in short: Neuralgic Fever.

Discussion:

SCHULZE: 1. Morphologically and in the culture medium the Rickettsia quintana is identical to the Rickettsia pediculi. If man falls sick, one speaks of Rickettsia quintana, if not, of Rickettsia pediculi.

By a repeated passage, however, the one form can change into the other.

2. There is no answer to the following question:

a) How long can the Rickettsia quintanae be found in the blood? (Detected even on the 23rd day of disease)

b) How long is the blood of carriers of Rickettsia infectious? Neither agglutinins nor precipitins against the Rickettsiae bred in the blood of patients were hitherto detected.

The above mentioned questions are principally important, because there is the danger of further infections when the patients return too early to their unit.

SCHULZ: A frequent measuring of the temperature is also important for a differential diagnosis from malaria. The examination of a thick drop of blood enables such a diagnosis.

GUTZEIT: Heretofore it is not known, how long the Rickettsiae remain in the blood. As the general course of the disease is not serious, no isolation for 3 to 4 months is possible. Therefore, the only way to struggle against this disease is a systematic delousing carried on also throughout the summer.

Directions (leaflet) on the Trench Fever.

"Trench Fever"(also called "Five-day Fever") is a disease which is characterized by the periodic occurrence of febrile attacks and a neuralgic-rheumatic syndrome, and which for the first time occurred in a large number of cases during World War I on the Eastern Front and later on the Western Front (Flanders). Since this time it has been studied in detail.

Cause: The Rickettsia quintana which lives as a parasite in the louse (dinstinguished from the Rickettsia prowazeki, which is the cause of the exanthematic typhus

and only sticks to the surface of the intestinal epithelial cells of the louse). It is traceable by applying healthy lice to persons suspected of trench fever.

Epidemiology: It is a typical war disease. Its distribution depends on the degree of infestation with lice and therefore the climax of its frequency is attained during the cold season (February to May/June). It shows a tendency to an epidemic distribution which under given circumstances may considerably reduce the strength of the combat units.

Incubation Period: Very varying. As long as 60 days.

Symptoms and course of the disease: Acute onset with a high fever, shivering or rigor without any prodrome. General symptoms are lassitude, heavy limbs, headaches (feeling of oppression in the orbits and in the forehead), vertigo. Rheumatic and neuralgic complaints, such as a painful condition of the extremities, muscular pains and occasional articular pains (without local findings) occur. Tenderness of the bones is typical, particularly of the tibial bone. There is some tenderness of certain nerves at the foramina where the nerve trunk leaves the osseous channel and along the nerves, hyperesthetic and hyperalgic zones, disorders of sensibility as well as reflex anomalies. In addition a tenderness of the spleen occurs, which organ is often enlarged. The diazo-reaction is negative.

Blood-count: A neutrophil leukocytosis is frequent, while a relative lymphocytosis and eosinophilia is present during remittance and during the period of convalescence.

The course is characterized by attacks of fever (4 to 6, even 12 and more) recurring in short intervals. The temperature curve shows two principal types: the paroxysmal and the undulating type. In the first case there is an interval free of fever of about 4 days (which may be shorter or longer) between the temperature climax which persists for 24 to 48 hours, in the second case the fever is irregular, remittent and shows an undulating climax of temperature. There are rudimentary forms. Elevations of temperature of short duration are occasionally overlooked, if there is no two-hourly measuring of the temperature. After the disappearance of the attack the patients usually recover quickly. Occasionally a prolonged convalescence is seen.

Complications: Herpes labialis (very rare), cardiac complaints of the anginous type with tachycardia, more rarely a brady cardia. Ileocecal pains which suggest the erroneous diagnosis "appendicitis". Secondary anemia.

Differential diagnosis:

a) Rheumatic diseases. Differential diagnosis by the anamnesia and the course of the disease.

b) Leptospriosis (Weil's disease and swamp fever) Pains of the tibial bone!

c) Recurrent fever and malaria. Differential diagnosis by the microscopic diagnosis of germs in the blood.

d) Dang's disease (undulating fever of man). Diagnosis by agglutination tests with the patient's serum.

Treatment: Symptomatic. Antineuralgics, particularly pyramidon and novalgin, occasionally had a good result. Antypyretics generally have no influence.

In rudimentary cases, when the disease is about to disappear the oral administration of arsenic is advisable (Pil.ferri-arsenicos containing 0.05 As). It may also be employed as a stimulating drug during convalescence.

The administration of convalescent serum or blood of convalescent patients is recommended but in any case of blood transfusion and examination of the donor's blood for lues is required .

Personal and general prophylaxis: Trench fever is the more numerous the greater the infestation with lice is. Delousing eliminates its base. For necessary measures see H.Dv. 194 (Army Regulations on disinfection and disinfestation), 209/XIX Directions as to the possibility of delousing, 209/2-100 Directions as to exanthematic typhus and Military Hygiene during Winter").

c) Recurrent Fever.

1. Lecture by Oberfeldarzt (Lt.Col.MC.) Prof.RODENWALDI.

Characteristic symptoms: The recurrent fever is practically never diagnosed on its onset but always at a later time. To recognize it, it is necessary to observe the temperature curve for a couple of weeks, if the principal symptoms are not known from personal medical experience, and if there is no possibility of examining a fresh blood smear.

As a principal symptom may serve the feeling of being seriously ill which is present subjectively and objectively from the first day on. Simultaneously an epistaxis, sometimes only petechial hemorrhages occur, secondary infections (pleurisy) are frequent.

Diagnosis: The examination of a fresh blood smear is obligatory if a microscope is available. Then the Spirochaetae recurrentis are visible in the blood, even without immersion. They are easily stained with methylene blue or eosin. It is important to bear in mind that this simple examination should be made even during the

intervals free from fever, since the Spirochaetae can be present in the blood even if there is no pyrexia.

Therapy: 0.45 salvarsan eliminates the patient as a source of infection. This therapy is successful, if the salvarsan is administered during or after an attack of pyrexia. Attention must be paid to the fact that the recurrent fever can be completely hidden behind an exanthematic typhus. Patients suffering from an exanthematic typhus must by no means be treated with salvarsan.

The Spanish recurrent fever and the Sprionema Ottoni (East Africa) cannot be treated with salvarsan.

2. Lecture by Oberfeldarzt (Lt.Col.MC).Prof. KOCH.

The anatomical picture of the recurrent fever is not so characteristic that a diagnosis can be made without further ado. This is very easy when the Spirosomae are traced.

The spleen sometimes shows changes which suggest recurrent fever. It is enlarged and allegedly attains three times its normal size. A great number of necroses frequently is seen which simulate a miliary tuberculosis. Moreover single or numerous infarctions are observed in about 50 per cent of all cases. The infarctions burst and even cause a rupture of the spleen and may perforate into the abdominal cavity when pus was formed as a result of secondary infection.

A swelling of the liver with necroses occurs constantly. Necroses allegedly are also present in the bone marrow. The kidneys may be affected too by degeneration and inflammatory processes.

The cerebral findings are important for the clinical symptomatology of the disease. A serous or a serofibrinous meningitis with many leukocytes is observed in connection with a cortical encephalitis and must be traced to the recurrent fever itself, as Spirosomae were found in the meningeal vessels.

There are reports of a hemorrhagic type of the alterations due to recurrent fever. Dermal, intestinal, and meningeal hemorrhages and those of the bone marrow were mentioned. It is not known yet, whether they are the consequences of the Spirosoma infection itself, or whether they are caused by simultaneous diseases such as tuberculosis, dysentery, scurvy and others.

Recurrent fever has a particular tendency to secondary infections. Pneumonic processes of all types are found in the lungs and, as a rule, they are the

cause of death. Moreover, however, septic pyemic processes are a frequent complication. Pyodermiae, abscesses of the organs, excretory foci, parotitis, pericarditis, and myocarditis must be mentioned. In the pus of these organic foci no Spirosomae are found. These specifically pyemic changes are probably the basis of the symptom complex of the bilious typhoid fever which is characterized by a considerable icterus and serious conditions of coma, if no real typhoid fever or Weil's disease are present in addition, since the recurrent fever may frequently occur together with other infectious diseases, such as diphtheria, exanthematic typhus, malaria, and others. Attention must be paid that in accordance with other organs having an abundant content of reticulo-endothelium, such as the spleen and the bone marrow, the liver is regularly subject to a primary impairment by the Spirosomae recurrentis. In these organs the Spriosomae are killed by lysines and they are phagocytized by the reticulo-endothelium when they are necrotic.

Further autopsies of patients who died of recurrent fever and of material resulting from obductions are desirable so that a constant anatomical survey can be obtained.

Discussion:

REX: In addition to the infarctions of the spleen which are underlined by Dr. KOCH, a particular emphasis should be laid on the diffuse follicular necroses of the spleen. The association of larger infarctions to numerous small follicular necroses may be apt to suggest the presence of a recurrent fever.

DORMANNS: Attention is called to the fact that PONFICK described follicular necroses of the spleen as characteristic for recurrent fever.

Two cases of extensive follicular necroses of the spleen in Charkow raised extended investigations of the recurrent fever. However, it was never possible to trace Spirochaetae in these two cases. Examination of thick drops attained from suspected cases, made upon frequent suggestions, were not successful in the hospitals of the 6th Army before 20 April 1942. Since, according to Russian reports, the number of cases of recurrent fever in Russia has deopped from 400 000 to 2000 per year during the last decades, which would agree with our observations, no serious attacks of recurrent fever are expected.

VII.

BACILLARY AND AMEBIC DYSENTERY.

(ANNEX: CLEANING OF FRUITS)

Translation prepared by:

Office of Military Government for Germany (U. S.)
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a) Bacillary Dysentery.

1. Prophylaxis, Therapeutic Aspects.

Oberstabsarzt (Major, MC.) Prof. ASSMANN.

In spite of all pains bestowed on it the control of dysentery is still the most difficult task compared to other war epidemics. The reason for this may be seen in the fact that the germs causing bacillary dysentary which under certain conditions occur regularly during the late summer and autumn are found almost everywhere so that the isolation measures successfully applied against other epidemics are hardly effective. On the other hand, the immunization against dysentery cannot compete yet with that against typhoid fever and cholera concerning effectiveness as well as harmlessness.

Theoretically one could imagine that the early diagnosis and isolation of the very first cases might prevent a further spread of the disease. Dysentery, however, is endemically distributed throughout the population of the territories where fighting took place, particularly of the Eastern Front. Moreover, numerous bacillary carriers might be with the troops who fought on several war theaters. When the first cases of dysentery are reported by a unit, one usually learns that similar cases have occurred almost simultaneously in other units. Some of them are severe cases with hemorrhagic diarrhea and violent tenesmus, some of them are slight cases with a slight diarrhea with no blood admixed; some of them are disguised as transitory gastric disorders in which cases the assumption even that this might be a case of dysentery immediately provokes a brisk contradiction. Particularly in these cases the practitioners used to make the strictest theoretical demands and to request a bacteriological diagnosis before taking practical measurements. As a result of the well known difficulties of the bacteriological diagnosis of dysentery this will take such a long time that in the meantime the epidemic of dysentery will be fully developed. As a matter of fact, on the basis of serologic investigations we must assume that the dysentery causes not only the well-known and most feared serious symptoms, but also occurs in a slight form as a scarcely noticed gastro-intestinal disorder. During every autumn we see that the number of persons with an abnormally increased agglutination titer is steadily increased with the course of time, even if only mild symptoms of disease had preceded. Here, I refer to the informations which I received from our consulting hygienist Prof. Dr. BACHMANN during the French as well as during the Russian campaign. It is however, quite incompatible with the military requirements to give these people the sick status and to isolate them, if they report sick in a large number.

Contrary to this, it is quite possible, and according to my opinion, even necessary to isolate the

dysentery patients and the suspected cases of dysentery within the hospitals and the casualty clearing stations from the patients not suffering from intestinal diseases. I observed quite avoidable contact infections in the smae rooms in places where these regulations were not carried through in spite of strict orders.

I believe that the most important prophylaxis against a further spread of dysentery is to build hygienic latrines and to fill them up with earth when leaving, and to remove the garbage and to cover it with earth. While the building and cleaning of the latrines is at least theoretically accepted by the units, although from evident reasons it is not everywhere carried through, a removal and covering of the garbage is accomplished only in few places in a really careful manner. I visited military hospitals which otherwise were maintained in a perfect order and only complained of an infestation with flies, asking for remedial measures; but if one inspected the back side where the cookhouse was, one noticed almost everywhere that the garbage was thrown into open pits or was lying around. These are breeding-places for flies which first of all have to be considered as the contaminators of dysentery. There, protective measurements must be taken.

Further prophylactic measurements endeavor to prevent an invasion of dysentery bacilli into the human body by means of specific preparations (immunization), by bactericidal living material (phages), or by increasing the general resistance of the body.

The results of the immunization are estimated differently. Since I noticed in the order of the day that a special report on the immunization and the bacteriophages is prepared by the consulting hygienists, I want to refer to this, the more, as I have no personal experience of the conditions in the operative theatres. In the Army District No. I no distinct differences between the course of the immunized and non-immunized cases of [illegible] disease were observed by the consulting medical specialist Prof. HANTSCHMANN, who is the deputy director of my clinic. However, numerous sequelae of immunization were observed by him such as abscesses in the thoracic area, some of which were sterile or contaminated with bacteria.

The experimental prophylaxis with bacteriophages is not impeded by such disagreeable by-effects, but its results are not made sure yet. Some of the reports on that matter, however, must be considered as encouraging. It is, of course, required to prohibit drinking unboiled water and eating non-peeled, dirty fruits.

I consider the following general measures of prophylaxis which are to prevent a decrease of the resistance, as very important and, for the time being, as equal or superior to the measures aiming at preventing the distribution of the bacteria.

These measures consist of a protection against chill and drenching and particularly they are to keep the body warm. During World War I as well as during the campaigns in Poland, France, and Russia I observed repeatedly that epidemics of dysentery occurred after a prolonged heat-period in summer, but usually not during this period but after it was succeeded by a sudden drop of temperature, a heavy rain, and a considerable drop of temperature. The easiest explanation of this peculiarity may be that the dysentery bacteria were widely distributed during the heat period and that the sudden falling ill of a large number of people was caused by their decreased resistance which was the result of a sudden cooling down. As far as the possibility is given which is not always the case during war but can be provided frequently, efforts should be made to pass the nights in quarters which are protected against rain and cold, such as tents, and above all to put on abdominal protectors before going to sleep. The French troops, particularly the colonial troops, always made use of such. When a considerable number of abdominal protectors was captured from the French during the campaign in France, I tried to fill up our stocks and to provide our soldiers with them. These measures are particularly important in regions where a considerable temperature difference between day and night occurs, that means, when there is a continental climate, as in Russia and Africa. They are less important for the Atlantic climate of the western countries.

During epidemics food poor in fat but rich in carbohydrates should be given such as noodles, rice, and semolina.

The most efficient therapeutic and prophylactic measures are heat, diet, and a careful nursing. The principal thing in the treatment of dysentery is not to employ new drugs, but to observe carefully old and approved principles.

This is done in the best way in special hospitals and homes for convalescent patients. In Poland and Russia I made the best experience with this system.

However, the special dysentery hospitals should not admit the patients of a too extended area. For, serious cases of dysentery should by no means be transported over a wide distance. The special dysentery hospitals must therefore be as close to the front as possible, and special quarters must be provided in addition in all military hospitals, casualty clearing stations etc. for those cases which cannot be transported. Homes for convalescent patients, however, to which these patients are transported who have regained a certain strength, may be installed more to the rear. The life of many dysenteric patients depends far more on avoiding an exhausting

transport than on the application of any medicament.

Compared with these general measures all other things are of minor importance. The following must be mentioned:

1. Intravenous or intramuscular therapeutic administration of immune serum during the initial stages of serious cases. In general it seems to be quite efficient, but a reliable estimation of the success is difficult as in stages of danger serum is regularly administered for good reasons. Hence, no comparison is possible with similar cases.

2. One single dose, but by no means continued administration of laxatives such as castor oil. A continuous administration of castor oil must be avoided, as the body is severely weakened by it.

3. Dessicated patients will be treated with sodium chloride and tutofusin infusions and with blood transfusions.

4. Intake of sodium chloride with the food, if necessary the intravenous injections of a 10% solution of sodium chloride are given to retain the water taken in and to prevent it from flowing off.

5. A careful control of the cardiac function and the blood circulation, particularly the treatment with strophantin when cardiac failure is imminent or present.

6. Anodyne and antispasmodic measures when there are colics and tenesmus.

Any other treatment will not be mentioned here, since I must assume that it is either known or less important.

To form my personal opinion about various drugs recommended by many people I made the following arrangements, when during the present Russian campaign a dysentery hospital was established at Hungerburg according to the principles laid down by GUTZEIT; In three of its departments, each of them being supervised by a medical officer, half the number of patients received no special treatment, except the usual special diet and application of heat; of the other half care was taken by certain measures. The patients of Department I were treated with Eubasin which was particularly recommended by the young medical officers; to those of Department II dysentery phages were administered and in Department III the treatment consisted of an apple-diet or Aplona. This separation of the departments was made in order to avoid that the patients receiving a differing treatment become suspicious. During my visits in this hospital every few days I found no noteworthy difference between the treated and untreated cases. Only Eubasin had often a disagreeable effect on the stomach which is known from its use in cases of pneumonia. Therefore, Eubasin was soon abandoned. Later on, when on account of my trans-

fer deep into Russia, I was no longer able to visit this dysentery hospital frequently, the view of the medical officers was slightly different. Then they believed that the additional treatment with phages as well as with Aplona had some effect; but they were not able to produce any objective evidence.

This shows how necessary a critical attitude is towards therapeutic measures. But the criticism must not be exaggerated to scepticism and as careful as I am in estimating the above mentioned medicaments, so firmly am I convinced of the decisive importance of the first mentioned therapeutic measures : heat, special diet, and nursing, furthermore infusions when the patients were desiccated and weak.

Complications of dysentery are frequent, particularly when the epidemics continue for a long period; they occur even in slight cases. A complete or incomplete Reiter's symptom complex is often seen but sometimes it is misunderstood at first and only a careful anamnesis and an agglutination test reveal the dysentery which had been overlooked, but which had preceded in all these cases. Almost all of the complications, however, took a favorable course with a symptomatic treatment even if they were of a long duration. Cases of chronic dysentery resulting in severe cachexia were noticed by me far more rarely now than during World War I. This may be due to the fact that within my sphere of activity the Flexner and E-dysentery were principally found while the Kruse-Shiga dysentery occurred only occasionally. In such cases blood transfusions should be made, which have a non-specific effect.

The main principles are summarized as follows:

1) Prophylactic measures:

Protection against chill and drenching, Abdominal protectors. Distribution of food rich in carbohydrates but poor in fat, when cases of diarrhea occur frequently.

Careful building of latrines and filling them up with earth. Removal of the garbage.

Concerning immunization and the prophylaxis by use of phages I refer to the report of the hygienist.

2) Therapeutic measures.

Heat, special diet and careful nursing are as necessary as an accurate control of the heart and the blood circulation; if these are impaired, treatment with Strophantin, in cases of desiccation infusions of any kind are required.

The application of dysentery serum, principally intravenously, is recommended in the initial stage of severe cases, although its effectiveness is not so sure. Exhausting transports of dysentery patients should be avoided.

2. Immunization, bacteriophages (Preservation and transport).

Kriegsarzt Dr. VIERTHALER.

The immunization against dysentery was prepared for this summer so that the largest part of the Eastern Army will be actively immunized.

The following vaccines are available:

A) Vaccine of the Behring Works: A polyvalent Formol vaccine containing a Shiga-fraction of about 20 per cent.

B) Serum "Zeiss" of the Hygienic Institute of the University of Berlin: a polyvalent Formol vaccine containing 40 per cent Shiga germs.

C) A Shiga-Formol vaccine according to OTTEN without dysentery germs poor in toxins. This serum is given simultaneously with the oral Entero-vaccine "Dysperos" of the Behring Works.

D) Aldystox, which is a combined adsorbing vaccine of the Behring Works.

Concerning the quantity, the sera mentioned under A) and B) form the largest part of the material available for immunization. OTTEN's vaccine which is given simultaneously with the Entèro-vaccine and Aldystox are employed only to a minor extent. The immunization is made in a comparable way so that a good survey about the effectiveness of the various vaccines available to us will be obtained by the end of the summer.

The relatively large portion of the Shiga-dysentery germs contained in the Formol vaccine of the Hygienic Institute was chosen because of the well-known fact that the Shiga dysentery relatively frequently shows severe forms and the revival of a Shiga epidemic cannot be excluded with certainty.

The Formol vaccine with which the largest part of our Eastern Army will be immunized was previously tested as to its tolerability: It shows no considerable local or general reactions as are usually seen with other vaccines such as the typhoid fever vaccine.

Phages. Opinion on the success of the prophylaxis and the therapy with dysentery phages differs considerably. A supply of the dysentery phages to the field-army for the purpose of prophylaxis is impossible, as the transport problem is extremely difficult. To yield sufficient results larger quantities of phages have to be given and several 10 000 kgm. have to be transported to the units to supply only a small part of the army. Naturally, this is not possible for the time being. A Special Department of the High Command (OKH) charged with the control of epidemics was ordered to produce specific phages at the places of operation in the Eastern theater and will investigate this problem thoroughly a second time.

3. Confused and Disputed Problems of Pathogenesis.

Oberstabsarzt (Major, MC.) Prof. LETTERER.

The attempt to regard the bacillary dysentery from the point of view that explains the entire pathogenesis causes difficulties. Apparently, the symptomatology of the disease, the behavior and the way of the germs through the sick body and the anatomical changes seem not to be in accordance with each other.

As impressive as the anatomical picture may be during autopsy - it is, as a matter of fact , no equivalent of the seriousness of the disease and of death; this is demonstrated by a fatal outcome of the dysentery within the first days of disease with very slight anatomical alterations of the intestines and even more by those cases with symptoms which have much improved clinically or have almost disappeared and who dying unexpectedly still showed a severe necrotic enteritis. Therefore, the pathologists referring to this question as to death from dysentery assert that it results not always from morphological damages of the colon; however, nobody denies that an intestinal damage and its consequences may sometimes be the cause of death.

When comparing the biological, toxic and chemical properties of the germs, no full accordance is determined between these and the anatomical alterations of the intestines which are uniformly and constantly found with all cases of dyserntery. There are differences of the properties of germs which result not in an anatomical equivalent. Biologically, that means with regard to the formation of toxins (ecto-and endotoxins according to Shiga and endotoxins according to Flexner and Kruse), and probably with regard to the chemical structure of the toxins (protein nature of the ectotoxin, polysacharid-lipoid nature or pure polysacharid nature of the endotoxin) the species are doubtlessly different; on the other hand it is not possible to differentiate anatomically cases of Shiga dysentery from Flexner or Kruse-Sonne cases; the latter seems particularly important to me as we now know that the Kruse-Sonne endotoxin is a pure polysaccharid. Cases of Kruse-Sonne dysentery dissected during the epidemic in Heidelberg showed no difference from the usual findings during dysentery (statement of Prof. SCHMINCKE). This discrepancy should solve certain doubts as to the correnctness of some ideas about the pathogenesis, since here the same anatomical picture is formed by apparently different substances, or their effects.

The Shiga bacillus which simultaneously produces a genuine neurotropic toxin and an enteroptropic endotoxin secretes directly the formed ectotoxins and causes an impairment of the body by them. Its ectotoxin allegedly is neurotropic only and has no impairing effect on the intestines. To my opinion this is not decided yet and I hold it certain only if dysentery

caused by O-forms which contain no endotoxin is proved experimentally and anatomically which in this case must not be accompanied by necroses of the mucous membrane of the intestines. As to the assumption that the ectotoxin of the Shiga bacillus is purely neurotropic, one must remember that there are cases of Flexner dysentery with a rapidly fatal outcome that means that they cause a pure endotoxin injury, which showed very slight intestinal alterations with minimal crust.

Things are different with the germs of the Flexner and Kruse-Sonne types. Here the toxin can only come into effect, if the germs have died. But where and why do they die and in which way is the body affected by this toxin?

These problems become more distinct, if one traces the way of the germs and compares the course of the dysentery with that of the typhoid fever which is also an infectious disease of the intestines. The assumption that the route of infection with dysentery is through the anus may now be considered as wrong and the oral way of infections may be the most frequent in the cases of typhoid fever and dysentery. After passing the oral cavity, the esophagus, and the stomach (relatively acid-proof germs, importance of gastric anacidity) the germs of typhoid fever and of dysentery arrive in the small intestine and behave differently there. While the bacilli causing typhoid fever are resorbed in the small intestine, which is of a decisive importance for the general distribution of the germs in the form of a typhoid fever septicemia, the dysentery germs are not or only exceptionally found in the blood. There is the problem of whether the dysentery germs are unable to pass through the intestines or whether they are immediately destroyed in the blood and thus cannot be demonstrated. As to the typhoid fever the latter is not likely, for, while with the typhoid fever the growth of the germs in the blood and in the spleen is the reason why defensive reactions of the body consisting of agglutination on the one hand, and a swelling of the spleen on the other hand set in these symptoms are not found with dysentery; a swelling of the spleen is rarely found, an agglutination reaction is absent in most cases.

While the spleen having the largest surface of the mesenchymal organs of defense reacts on the germs of typhoid fever to be killed and their endotoxins by a large soft swelling which is caused by a voluminous formation of pulpa cells, the dysentery progresses without an enlargement of the spleen and any reaction of the pulpa. The spleen remains small and hard, hence it may be concluded that no noteworthy bacteriemia occurs. If this is not present regularly, measures destined to save by a prophylactic humoral resistance against the germs, such as the immunization against typhoid fever, do not promise the same complete success in the case of dysentery as they do with typhoid fever.

Here, a comparison with diphtheria is permissable. There too, the bacteriemia is slight except for some few findings. The formation of ectotoxins by the germs stands in the center of the pathological effects; here too, the spleen is usually small and hard, here too crasts are formed on the epithelial surfaces, and here too, there is a full success of the therapy with a antitoxin and of the methods of a prophylactic treatment with antitoxin. In my opinion it is no mistake to regard dysentery as an intestinal diphtheria, not only from the anatomical point of view, from which it is seen as a so-called diphtheric inflammation, but also from the pathogenetic point of view. Under this aspect one should expect that for dysentery too, the treatment with antitoxin is the adequate method.

The excretion of bacilli of the typhoid fever with the bile results in a return of the germs in the intestine, the resorption through the mucous membrane occurs for the second time and during the first process of resorption the germs passed the intestinal wall without causing a noteworthy alteration it reacts at the second time with an attempt to block the resorption, which is morphologically expressed in a medullary swelling of the lymphatic organs. Since the development of such a reaction (allergy, hyperergy-pathergy), takes a certain time the incubation period of the typhoid fever can be regarded as the manifestation of the time factor. In this regard things are different with dysentery. Its incubation period is considerably shorter, and, under these circumstances, we wonder what the mechanism of the development of its clinical and anatomical symptoms is. The bacteriologists believe that these problems are almost settled as it is a fact that the dysentery toxins have an enterotropic effect. A similar tropism allegedly occurs with the diphtheria too. Since the investigations of DOPTER (1903/06) and particularly since the excellent studies of DOERR on the Shiga toxin in 1907, there is no doubt that Shiga toxin given subcutaneously in animal experiments may provoke a serious dysentery on the colon of rabbits in the same way as does the infection of a broth culture medium of the germs themselves. A direct injection of the germs into the colon, however, causes no dysentery when the rabbit is healthy. DOERR concludes from these observations that the toxin is secreted from the colon and that it injures the mucous membrane in a similar well-known way during this process of secretion as does mercury and other metal salts when they are secreted through the colon. If one evaluates these experiments critically one may ask whether the quantities of bacteria and toxins used during such investigations are approximately the same as the quantities playing a part during the actual process of disease and whether the doses applied are not considerably too high. In the case of the enterotropic endotoxins the germs must first be killed in the intestine before their toxins can be resorbed. But in which parts of the intestine will this resorption take place and in which of its sections are the dysentery bacilli killed?

Is in this case the colon the organ of resorption and secretion simultaneously? DOERR demonstrated that the small intestine has a specific function to neutralize the Shiga toxin; hence, it might be resorbed there too, but then the germs would grow in the small intestine rather quickly and secrete their toxins through the colon, where they were carried by the blood. Nothing is known of these processes, neither of a possible growth of the bacilli in the small intestine nor why as bacilli they are apparently not resorbed at all. It must be left open whether this is the only possible explanation. With regard to therapeutic measures it is desirable to elucidate this problem.

For the pathologists the regularly ascending tendency of the intestineal alterations is particularly conspicuous. It is difficult to bring this in accordance with the conception that the mucous membrane is injured by secretion of toxin, as this is supposed to be a diffuse and constant process. Local processes must also play a part here; even VIRCHOW referred to a retarded motility at the curvatures of the intestines, which enables an increased effect of the toxins there. If one assumes that the dysentery bacilli, which went into the small intestine through the mouth, grow there and are killed in the large intestine by the influence of the bacteria (Coli), bacteriophages present there, and by the changed chemism of the intestinal fluid, the development of the anatomical damages can also be explained by a local effect of the toxin without that there is any reason to contest the resorption and excretion of the toxin as an additional symptom. The progressive thickening of the intestinal chymus and a certain decrease of the intestinal motility towards the sigmoid and the rectum would explain the increased toxic effect towards the terminal parts of the intestine. To elucidate these questions particular attention should be paid to the conditions in the small intestine. According to DOERR's studies one may assume that the Shiga bacilli are able to produce toxin in the small intestine, but that the mucous membrane is indifferent against it due to a mechanism which binds the toxins. There is no excretion of toxin with the bile, as was also demonstrated by DOERR. Direct and indirect toxic effects are summed up in the colon. In this case, the toxic effect of the endotoxin would develop only in the colon where the destroyed bacilli are and the seriousness of the general symptoms of disease would depend on the quantity of destroyed bacilli and a larger or smaller resorption of toxins.

Furthermore, the pathologists will wonder what type of the toxic effect occurs in the intestine, namely whether there is a necrosis due to a chemical effect of the toxins, which means a direct effect, or whether there is another type of necrosis due to circulatory disorders. The microscopic examination alone is hitherto not able to decide this satisfactorily. The enormous congestion of the terminal vessels observed by DOPTER and others is remarkable indeed. This suggests that the

toxin injuries the epithelial cells not only directly by invading them from the intestine or passing through them when it is secreted, but that a component damaging the vessels is also present, which either occurs simultaneously with a damage of the epithelial cells, or provokes it. To elucidate this experiments should be made which investigate the toxic effect of carefully characterized toxins on the capillaries. Personal experiments concerned with that matter are not finished yet. The histological investigation of early cases with damages about to appear should be pushed on as much as possible, since the morphologic observations seem to suggest that a vascular impairment is an important component. This is particularly obvious with early cases which show a very considerable hyperemia of the smallest and medium-sized vessels. In the histologic picture attention is frequently attracted by white and hyaline thrombi in the capillaries, which are enormously filled. I have the impression that the epithelial cells and glands are only secondarily involved when the mucous membrane is impaired; for, with early cases they are not yet altered, even when the cellular and fibrous interstitium was impaired by a stasis, hemorrhages, and a fibroid necrosis. At any rate, it is sure that the impairment does not origin from the epithelial glands, but from the interstitium and the vessels. Another question may be what the extent of the inflammatory and of the circulating components of the rather considerable submucous edema is. This too, can only be cleared up by a very fresh and properly hardened material, which should be remembered during future autopsies.

Discussion:

GUTZEIT: Mr. LETTERER believes for theoretical reasons that dysentery can be prevented by immunization. The recently introduced prophylactic dysentery immunization will show whether this is possible. To evaluate the result of this vaccination the following measures are necessary:

1. To make a note in the soldiers' pay-books as to the type and dose of the vaccine used - 4 different vaccines are available - and of the date of the vaccination.

2. To keep accurate statistics in all army groups in which the immunization was carried through, on the number of dysentery cases and the cases of diarrhoea in relation to the actual number of men.

If this will be done, one doubtlessly will be able to draw conclusions on the effectiveness of the various vaccines and to prepare the most efficient of them for future times after the following dysentery epidemic.

The great number of chronic intestinal diseases observed during the winter, which resulted in a considerable general weakness of the patients, and which some-

times is caused by a chronic dysentery and sometimes by post-dysenteric intestinal injuries, makes it necessary to cure the cases of summer dysentery thoroughly and not to discharge these patients to their units as fit for duty too early. If these hints are sufficiently observed, post dysenteric intestinal injuries are avoided. Moreover, HCl-pepsin not infrequently has a rapid effect on such a chronic disease, since this is often accompanied by an anacidity of the gastric juice.

It is important to know that comparative investigations of the treatment of dysentery by HOLLER during the last Flexner epidemic revealed distinctly that in cases of a fresh dysentery a massive therapy (6, 5, 4, 3, 2, 1 gm. in daily decreasing doses) with Eubasin was superior to the special diet and heat therapy as well as to the phage therapy. However, the dose of this drug must be high enough. 3 times 1.0 gm. per day are apparently not sufficient. The results of HOLLER are statistically proved. Approximately the same favorable effects may be expected from serum therapy which should always be employed, when there is a serious pyrexia. BIELING reports that the sulfonamides, also have effects upon the contact carriers of dysentery. Instead of Eubasin, which sometimes causes disorders of the stomach, an equivalent dose of Eleudron may be given.

WALTHER: Bacteriological investigations revealed a distinct effect of the sulfathiazoles and sulfapyridins on the gram-negative bacteria, particularly on the dysentery bacilli. This shows that it is advisable to use these preparations for the treatment of the bacillary dysentery.

VOIT: A large dose of Eubasin (6gm.pro die) sometimes had the favorable result that the hemorrhagic diarrhoea disappeared earlier than without this drug.

The greatest emphasis should include an extensive supervision of the lavoratories and one must particularly insist on covering of the faeces with earth.

HOLM stresses the importance of an individual heat protection device (abdominal protector).

KAUFFMANN: One cannot warn enough from taking cold drinks. It occurs rather frequently that toxic symptoms of an adrenal deficiency occur which are easily checked by Cortiron.

SCHREIBER: The use of dysentery phages during wartime is not advisable from the military point of view. The issue of phages is only allowed to the Special Group for Epidemic Diseases of the High Command of the Army.

WOHLFEIL gives his differing views on the percentage of the components of the dysentery vaccine. He makes the following statement:

1. There is no Shiga dysentery at all in the central parts of the Eastern Front. Only the Flexner dysen-

tery is usual there.

2. An inhibition of H. SCHMIDT's (Marburg) antigenic effect must be expected when Shiga bacilli and cultures poor in dysenteric micro-organisms are given together.

3. For the purpose of therapy only monovalent anti-dysenteric sera should be made available in the Medical Supply Units.

BIELING confirms the 1st statement and says that in the region of his Army Group too the Flexner dysentery appeared exclusively. The less they have been subjected to a procedure of purgation the more the endotoxins act as antigens.

RODENWALD replies to the question with his experience of the continuity of the protection of Mecca pilgrims and the Dutch Army in Insulinde, which was vaccinated against Shiga for 17 years by the Otten vaccine. R. is of opinion that the protection lasts for at least half a year. The value of this type of vaccination depends on its results.

MUGROWSKI states that according to his investigations Shiga dysentery seems to occur only in Southern Russia. However, this may change again. The dysentery immunization of 12 400 prisoners in concentration camps revealed the absolute inefficiency of the adsorbate vaccine manufactured by the Behring works, while Dysbakta was very effective in 11 000 persons and the vaccine of the Saxon Serum Works on 8 000 persons, as also the Dysperos on 4 000 persons. However, the evaluation was only based on the outcome of whether a camp epidemic was stopped or continued. The Asid vaccine was not investigated. Phages (Behring Works) given three times as a dose of 10 cc. every 14 days were very successful with 12 000 persons.

CLAUBER: Refers to the principal results of the numerous investigations of the problem of the active dysentery immunization made in the Institute for General and Military Hygiene of the Military Academy. Various old, new, and the latest vaccines were tested by examining the serum of man for anti-ecto- and anti-endo-toxins. The results were:

1. There is no final and incontestable solution yet of the problem of "active dysentery immunization", although a considerable improvement was accomplished in the last years, so that it seems to be justified to practice it at the present time.

2. The adsorbate vaccines which were particularly recommended during the last years proved no more advantageous than the formol vaccines. However, one must take into account that the efficiency of the latter is reduced during storage. The assumption of PRIGGE, which was repeatedly confirmed by experiments, namely that the

formalin does not metamorphose the Shiga-ectotoxin into a toxoid, but that it destroys it in the course of time increasingly until it has become completely useless was supported by the tests. Even the effect of the endotoxins was reduced later on, so that investigations must be made of whether the formalin reduces the antigenic functions of the dysentery endotoxin. This question may be of some importance because it could be proved that the admixture of formalin was demonstrable for several months. This shows that the formalin is decomposed only very slowly. Therefore, the formol vaccines can be kept on storage for a limited period of time only. Further tests are to show whether the formalin can be bound by suitable chemicals without any impairment of the vaccine after if has served its purpose.

3. The results of the immunization may be improved when vitamin C is given to vaccinated persons suffering from a deficient vitamin C supply. Therefore, attention has to be paid to provide enough vitamin C when the food is poor in vitamins.

4. In the combined vaccines against dysentery and tetanus the dysentery antigen was reduced in favor of the tetanus antigen, so that the greatest caution is required when combined vaccines are used for the immunization against dysentery.

VIERTHALER: For the time being the formol vaccine is the only vaccine available. If one attributes a great importance to the concurrence of antigens, any immunization with a polyvalent vaccine is impracticable.

KOCH: The marked submucous edema is conspicuous. Like the circulatory disorders it is probably of a toxic origin.

SIEGMUND: According to my investigations the alterations of the mucosa during dysentery are initiated by circulatory and vascular alterations which include an ordinary peristatic hyperemia with a plasma diapedesis as well as a complete stasis with a corresponding impairment of the tissues and the epithelium. I am of opinion that the general cause of these disorders is an altered permeability of the mucous epithelium for the toxins releasing the vascular changes. I made reference to the relation of dysentery to the serous inflammation during a lecture held in a conference of consulting specialists.

CLAUBERG: As to the formol dysentery vaccines I want to make reference to what I stated above and to underline that these vaccines are not sufficiently tested yet, and that no final opinion can be given on them. Particularly the period during which they are employable should exactly be determined. We have observed that old vaccines may become valueless. Failures of the immunization against the dysentery with formol preparations, therefore, should not be attributed to the procedure as such.

Furthermore the problem of the dysentery bacillus carriers has been repeatedly discussed in recent times. Previous observations by which it was shown that in regions where dysentery occurs as an endemic infection, the dysentery bacillus carriers may be the rule and the disease itself an exception, were frequently confirmed. Thus it needs no particular explanation that under certain conditions an epidemic of dysentery breaks out within a latently infected unit, when the physical resistance of the men is reduced by climatic conditions, inappropriate food, unusual exertion, etc. Such an epidemic may show any clinical symptoms, from a harmless enteritis of short duration to a most severe fatal disease with the symptoms of cholera, according to the disposition of the patients. This knowledge prevents us from accepting the much discussed erroneous and dangerous hypothesis that under certain conditions the common intestinal bacilli are transformed into dysenteric bacilli.

As to the repeatedly discussed close connection between dysentery and a hot climate, I should like to mention that besides the wellknown causes of the chronological coincidence of dysentery epidemics and high temperatures during summertime, functional disorders of the gastro-intestinal secretion play a part. According to recent studies a diminution or even a cessation of the gastric secretion may occur during high external temperatures. An ordinary acid gastric juice destroys the dysentery bacilli within 15 to 20 minutes. Hence, it takes part in the physiological defense measures against an infection. If a secreted amount of the gastric juice is diminished or if there is a complete achlorhydria, its protective action must also be reduced or must cease entirely. Therefore, one should attempt to prevent this possibility by administering acid drinks during heat waves.

Moreover, the importance of the flies for the contamination with dysentery was stressed. This is still more important as tests of ROSE and co-workers became known recently, according to which in addition to the danger of an ordinary passive bacillary contamination through the adhesive lobules of the fly legs the following mode of infection is possible: The dysentery bacilli take over the task of the symbionts required for the development of the fly larvae. The bacilli are enclosed by the larvae, where they remain during the pupa stage. Then they reappear with the excretions of the flies.

Directions for Measures against Dysentery.

I. Prophylaxis.

a) General hygienic measures:

1) Lavatory hygiene: If possible build covered lavatories and fill them up with earth before leaving the camp.

2) Remove the slaughtering and kitchen garbage. Keep the garbage dumps covered.

No effective prophylaxis against the flies which play such an important part in the distribution of dysentery is possible if these measures are not carried through carefully.

b) Personal prophylaxis.

1) Drinking unboiled water should be forbiddon. Cold drinks must be avoided. The flasks should be filled with coffee every morning.

2) If possible a protection against cold and wet should be provided. Building of tents. At night abdominal protectors should be worn.

3) With the frequent appearance of intestinal diseases food poor of fat but rich in carbohydrates should be issued.

4) A general immunization against dysentery was ordered. The following vaccines will be used: 1. The polyvalent vaccine of the Hygienic Institute of the University of Berlin. 2. The polyvalent vaccine of the Behring Werke, 3. Aldystox. 4. The Shiga vaccine according to Otten (together with Dysperos). The pay-book and on admission to a hospital the medical history must contain a note as to which of the four vaccines mentioned was used.

II. Treatment.

1) No long-distance evacuation. Experience has shown that the lives of many severe cases depended on the observation of this rule.

2) Therefore dysentery hospitals should be established as close to the frontline as possible. Furthermore, special wards for dysentery cases and those suspected of dysentery should be organized in all casualty reception stations, casualty clearing stations, and hospitals.

3) To relieve the hospitals convalescent homes for dysentery patients should be set up, and units be formed of such patients. No discharge to the units

unless the general condition is good and the ordinary diet is well tolerated. No discharge of dysentery convalescents from their Army Group.

4. The treatment of dysentery patients with heat, an appropriate management and a special diet are of a greater importance than the administration of medicines.

5. Castor oil should be given at an early time and to start the treatment, but not over a long period. Mild laxatives such as Epsom salts may be given over a prolonged period. No opium must be given in the beginning of the disease nor should it continuously be employed in the course of the dysentery.

6. In severe cases an early treatment with dysentery serum is advisable.

7. The use of sulfonamides (Eubasinum or Eleudron which causes fewer disorders of the stomach) has given an encouraging but not conclusive experience. When employing them comparatively large doses should be administered within a short period of time; on the 1st day 6 gm., 2nd day 5 gm., 3rd day 4 gm. and so on. The total dose should not exceed 20-30 gms. When the stomach refuses them, no oral administration is possible.

8. In cases of desiccation sodium chloride or tutofusin should be injected. Moreover, sodium chloride should be given per os in addition to hot drinks, so that the fluid can be retained in the tissues.

9. Under certain conditions a solution of 10 % sodium chloride (20-40 cc.) may be injected intravenously. A blood transfusion may be useful.

10. The heart and the blood circulation must be watched carefully. If a cardiac failure is imminent, strophantin must be administered.

11. During the after-treatment hydrochloric acid is appropriate in cases of gastric disorders which are frequently due to an achlorhydria. If a chronic dysentery is accompanied by cachexia, a blood transfusion is advisable.

b) Amebic Dysentery.

Oberfeldarzt (Lt.Col. MC) Prof. RODENWALDT.

As long as one knows the protozoa occurring as parasites in the cavities of the body the discussion of their etiological significance as pathological micro-organisms has not come to an end. It is well known that studies are repeatedly published in which, in want of a better

explanation, the thesis was set up that the lambliae and trichmonads were the causative germs of the colitis, vaginitis, etc., because great masses of flagellatae were found in the stools or in the vaginal mucus. But other studies are published too, which refuse just as frequently the etiological significance of the flagellatae, and one must say that the knowledge of the matter is no better today than it was 30 years ago, when stress was laid upon the fact that no clear evidence of the pathogenesis was available, and that one was only able to state that the flagellates enhance in the one or the other way the growing pathological processes through the great number in which they appear. But there is no decisive proof of such a thesis. The statistical evaluation has also failed.

Among these protozoa the amebae received particular attention from the beginning. This may not be justified, since it certainly is no usual idea that the amebae are also flagellatae which lost their organs of propulsion by their living as parasites. There are even amebae which under certain disadvantageous conditions form flagellae. But otherwise the resemblance is evident. In a certain environment the trichomonads are also able to move away by their pseudopodia. The cell structure shows no fundamental difference.

The problem of which entameba causes amebic dysentery became less complicated soon after its discovery about 50 years ago. It was discovered rather early that large ent - ameba coli having a uniform plasma and forming cysts with eight nuclei practically never contain any erythrocytes and are not pathogenic.

Since SCHAUDINN's studies nobody was ever really in doubt that the entameba histolytica causes amebic dysentery. They contain erythrocytes even in cases of an acute dysentery and were found on the bottom of the intestinal ulcers of fresh and chronic cases of tropical dysentery and in the pus of the liver abscesses.

Before 1912 it was almost a dogma that all dysentery cases occurring in the tropics were amebic dysenteries, while all dysentery cases occurring in the temperate zones were bacillary dysenteries. In the present time this is recognized as a big mistake.

But it was always doubtful how the findings in the fresh specimens of the stools should be interpreted. It was a great surprise when in the course of World War I amebae were found during the examination of soldiers who returned from hot countries and previously had never suffered from dysentery at all. When the indigenous population was examined subsequently it was repeatedly confirmed that a high percentage of the population of the temperate zones were also amebae carriers (in our zone 14%) who had never suffered from dysentery previously, nor fell sick later. It is true that no erythrocytes were observed in these entamebae, but as to their shape, their motility, and their structure they resembled the entameba histolytica closely. Their cysts having four

nuclei, had the same shape as was heretofore described for the cysts of the entameba histolytica.

Concerning this observation I want to mention that the recent research work has disclosed that the entameba histolytica occurs in man in two forms: As the tissue-invading form, which is the ent. hist. in the proper sense, and as a form which is present in the intestinal lumen, the precystic form of the ent. hist. This is a saprophytic, and inoffensive intestinal parasite. The most important factor, however, is that the pathogenic stage of the ent. hist., which is the tissue-invading form, never forms cysts. These are exclusively produced by the precystic form. From this the important conclusion must be drawn at first that it is not permissible to diagnose amebic dysentery from the presence of cysts exclusively as frequently occurs even at the present time. This would be a mistake even if the patients had suffered from dysentery previously, since this might have been of another origin.

The only reliable conclusion to be drawn from the presence of cysts is that the carriers of the precystic forms are liable to an amebic dysentery. The modern thesis is that the precystic form may, but by no means must be transformed into the histolytic form, that means the tissue-invading form, as soon as a possibility is given by some injurious even to invade the tissue of the intestinal wall through a locus minoris resistentiae. This happens more frequently in hot countries and at certain seasons than in temperate zones. Therefore, it is a disease occurring in hot countries. But infections with the amebic dysentery may occur even in our climate, and it is a well known fact that an amebic dysentery contracted in hot countries may continue in our zones. Without drawing far reaching conclusions I want to refer to the fact that this thesis is not yet incontestable. It is well known that cats can be contaminated per anum with the entameba histolytica and the anatomical signs of a real amebic dysentery be provoked. But WESTPHAL found that it is possible to provoke exactly the same symptoms with cats, if one first filters the stools of a sick cat used for the contamination and employs this filtrate which is free of amebae to contaminate another cat. Such an observation calls forth some scepticism and it suggests that another micro-organism, probably a virus, might possibly be involved as well, and that the occurrence of amebae transformed into tissue-invading forms is only a secondary event. The method of how the amebae destroy the tissues, whether directly or by an enzymatic effect is also not yet incontestably known. But these interesting studies are of no practical significance, since the entameba histolytica remains at any rate the most important indicator of that specific intestinal disease which is called amebic dysentery, and also of its complication, the liver abscess.

A proof of the diagnosis of amebic dysentery in addition to several clinical symptoms is the presence of the tissue-invading forms in the fresh specimens or the stained preparations, that means of a creeping entameba putting out its pseudopodia, and a distinct difference between its endo- and ectoplasma. Many amebae in acute

cases almost all of them enclose erythrocytes in their gelatinuous mucus which contains few leukocytes.

Here, I make no detailed reference to the clinical findings which must also be critically considered, since it is very difficult to evaluate correctly the findings in the native preparation. A considerable experience is required for this. The microscopical examination of the stools with regard to amebae is a most difficult task. The clinical signs which permit the diagnosis are the proctoscopic proof of typical rectal ulcera, which also permit the retrospective diagnosis of a liver abscess as due to an amebic dysentery. However, it is certain that the dysentery of a bacillary origin and intestinal diseases of another etiology are much more frequent than amebic dysentery. The presence of precystic and cystic forms does not permit the diagnosis of an amebic dysentery. This can only be made sure when tissue-invading forms are found.

From the epidemiological point of view one must state that the carriers of precystic forms are more liable to fall sick with amebic dysentery when a locus minoris resistentiae is developed than persons who are free from them. But there is no reason to believe that such people necessarily contract an amebic dysentery when they come into the tropics as was recently stated. If this would be the case about 14 % of all Europeans going to the tropics would fall ill with amebic dysentery. In the populous towns of the Dutch Indies where there is a continuous coming and going of Europeans, no such findings are known. Despite the fact that the percentage of Europeans becoming carriers of the intestinal forms is much greater in the tropics than in Europe, the amebic dysentery has become very rare in tropical cities with comparatively satisfactory hygienic conditions under the conditions of peace. Since Yatren and Riboflavin have been used the liver abscesses have almost disappeared. War changes these conditions. Then the intestinal disorders become more plentiful and the possibilities of a metamorphosis of the intestinal forms into tissue-invading forms become more frequent. To reduce these possibilities by providing an adequate diet, by combatting bacillary dysentery and other intestinal diseases, by providing an entirely safe water supply and the best possible garbage and sewage disposal system, is the most essential base for any defense against amebic dysentery during war time. The result of the present tests will show whether the prophylactic administration of Yatren or Riboflavin will be helpful in controlling amebic dysentery. But there is no help against a certain percentage of people becoming carriers of precystic forms in hot countries and carrying these forms with them. The same applies to the gradual and steady increase of their number. To check the distribution of amebic dysentery by segregating these carriers in the homeland or by curing them, or by examining them when arriving in the operational areas and sending them back, is not practicable. Such a suggestion is compatible neither with an epidemiological nor with military reasoning.

Discussion:

HAUER: I should like to discuss from the viewpoint of clinical medicine some points which seem to me of a particular importance for the medical officers of the units as well as for the practitioners. Two of them may be particularly underlined; these are:

1) As impossible as it is not to notice the fully developed symptoms of amebic dysentery with its triad of gastric pains, a diarrhea with an evacuation of a hemorrhagic gelatinous mucus, and continuous tenesmus, it is equally easy to overlook the atypical course of acute and chronic amebic dysentery. The former is sometimes hidden behind a common diarrhea while the latter is accompanied by frequently atypical symptoms such as gastro-intestinal disorders, nervousness, pains, particularly of the left hypochondriac region, and by a loss of weight. Quite a number of cases of amebic dysentery occur and then are present for many years without the slightest disorders of the digestive function of the gastro-intestinal tract. It is, therefore, desirable that every soldier reporting sick and previously or recently living in warmer climatic regions be immediately examined for entamebic histolyticae.

2) More than that the attention of the practitioners and of the medical specialists serving with the units must be directed to the liver abscess which is the most misunderstood or overlooked tropical disease. If any person who previously or recently had spent a certain period of time in a country where entamebic histolyticae occur falls sick with pains in the right hypochondriac region, remittend fever, and marasmus, the possibility of a liver abscess must be borne in mind without regard to the fact whether the patient concerned suffered from dysentery at an earlier time or not. It should not happen again that a man falling sick with periodic febrile attacks and hemorrhagic stools in the Balkans is admitted later to a hospital at home under the diagnosis of a typhoid fever and then dies from malaria because nobody took this disease into consideration and because no blood examinations were made at the right time. It should not happen either that a soldier who reported sick with diarrhea in Northern Africa dies in a hospital at home from an undiagnosed liver abscess.

One particular case may be stressed: A 38 year old corporal, who was never sick before, was transferred in May 1941 to North Africa with his unit and fell sick there with a severe diarrhea in June 1941. This diarrhea grew worse towards the end of the year and mucous hemorrhagic stools were passed as frequently as 10 times daily. By the end of December an icterus appeared. The patient was transferred to a hospital at home. When he arrived his temperature was 38.3°C., the pulse rate 118/min. The temperature curve showed high remissions. There were no pronounced pains in the right shoulder or in the hepatic

region. Precystic and cystic forms were found in the stools. A Yatren cure was made. The diagnosis of the surgical department was carcinoma of the rectum. As the condition of the patient deteriorated, he was transferred to a surgical ward, where the surgical intervention was postponed to a later date. The amebic infection was preliminarily treated with Yatren. The condition of the patient continued to deteriorate, a severe collapse occurred and the patient died. The autopsy showed an extensive ulcerating colitis with multiple abscesses and perforations of the sigmoid. There was a suppurative peritonitis and several liver abscesses the size of an egg. One of them had ruptured into the thoracic cavity.

In this case the patient would have been saved, if one had thought of the possibility of a liver abscess and adequately treated him with emetin.

Patients who previously had not suffered from intestinal disorders may also suddenly fall ill with a hepatic abscess. Two such cases will be reported here, one of them being that of a soldier who suffered from amebic dysentery many years ago in Eastern Africa, the other one being a member of the German Africa Force, who for the time being is under treatment in the Military Hospital # 118.

The former was a 26 year old private who was a farmer's assistant in Africa from 1935-1939. There, he was repeatedly contaminated with malaria, the last time in 1937, but he had never noticed any signs of intestinal disorders. During the battle of France he was subjected to great physical exertion and he fell suddenly ill with rigor, high pyrexia, pains in the right chest and a dark, hemorrhagic sputum. From the station hospital he was transferred to other hospitals with the diagnosis influenza, pneumonia, similar diseases, then malaria, sepsis and tuberculosis were suspected successively. Finally he was admitted to the Military Hospital # 118 under the symptoms of a chronic malaria and a diaphragmatic irritation. The margin of the liver was palpable and there was a considerable tenderness of the gall bladder region. Previously the malaria was not considered as the cause of the symptoms, but rather a pneumococcal septicaemia and appropriate investigations were made. When a blood culture and all other examinations had a negative result, the suspicion arose that the symptoms might be due to a hepatic abscess. The inspection of the provoked stools revealed the presence of precystic and cystic forms of the entameba histolytica. The treatment consisted of the administration of Emetine and Yatren. From the first day of treatment on the persistent pains in the right hypochondriac region disappeared, and on the third day the remissions of the fever which were present for 93 days vanished entirely. The patient recovered rapidly and his body weight was increased by 14 lb. The hemoglobin was restituted to 100 %. The patient was sent back to his unit and for a long time he has been fit for duty.

A similar case is that of the 32 year old corporal Erich E. This soldier served with his unit during the battle of France and was then transferred to North Africa where he remained from March 1941 to March 1942. Previously he did not have any intestinal disorders. A temporary loss of weight was noticed by him during that period of time. On 4 April 1942 while on leave, he suddenly fell sick with a rigor, a high pyrexia (40.5°C.), a profuse sweating during the night. No pains were felt at the onset. He was admitted to the Station Hospital # 118 with the diagnosis of malaria. The thoracic organs showed nothing abnormal. The liver was not palpable. The blood count showed 12 000 leukocytes, the differential blood count 14 % band forms, 46 % neutrophils, 33 % lymphocytes, 7 % monocytes. On the third day the patient was in a toxic condition. There was no tenderness of the liver, while there was a slight bronchial rasp and a dullness on the right thoracic region. The differential diagnosis was: Pneumonia after an exudate, or liver abscess . A Eubasin course with 6 gm. was not successful. In the stool lambliae were found, but no amebae. From 12 May on, pains were continuously felt in the right chest. The liver was not palpable, but somewhat tender. No amebae were found in the stools.

Urine: Urobilinogen + +, Deposit: hyaline and granulated casts. Pleural puncture: The pleural cavity seemed to contain no fluid. Subsequently a creamy yellowish pus was withdrawn. There were no protozoae in the aspirated fluid, but it contained bacilli and a few cocci. The patient was transferred to the surgical department of the Military Hospital # 122, with the suggestion that there might be a liver abscess. A Buchlau drain was used and the diagnosis of liver abscess confirmed. The temperature dropped slowly and the X-ray findings showed nothing abnormal in the lungs, but a typical elevation of the diaphragm at the right side. The patient was transferred back to the Military Hospital # 118 again. Entamebae histolyticae were not found before the 28th day of disease. Then vegetative and precystic forms as well as cysts were confirmed in the specimens.

The cases of amebic dysentery admitted to the hospitals during this war were either old cases of previous infections in Africa, China, South America and other countries, or new cases of the disease which were acquired during the war in Southern Europe, North Africa or Russia. At first only old cases with a definite anamnesis of amebic dysentery were admitted to the Military Hospital # 118. The complaints were similar to those above. They were increased in severity or provoked by the service with the units. We were able to cure a number of such infections acquired in the past. However, quite a few of thess patients attributed their disorders to an amebic dysentery which actually was cured; here, another disease was usually active which, therefore, made us think of similar cases of post-war malaria. Amongst the admitted patients sent from the Russian front which were contaminated there, 1st Lt. G. was particularly of

interest since he was the only patient with whom I noticed the usual collection of all the symptoms of amebic dysentery together.

The North African entamebae histolyticae are of another type. Cases of amebic dysentery have occurred frequently since the middle of August 1941. From this time on 181 clinical cases have been observed. They usually had the same previous medical history: Frequent thin stools which were accompanied by fever for several days, temporarily hemorrhagic stools, a considerable loss of weight, and a continuous or a periodical diarrhoea. However, these are vague and atypical symptoms. The disease is hidden behind the symptoms of an ordinary enteritis. In the stools precystic or cystic forms are usually found, while tissue invading forms occur infrequently. In cases of a demonstrable strain, but even without any obvious reason one sees that latent infections become virulent,and dangerous complications are sometimes observed. Therefore, the North African type of amebic dysentery has a particularly insidious character.

I am of opinion that the question of whether these carriers of precystic and cystic forms in North Africa should be treated like amebic dysentery patients, ought to receive a positive answer, provided that the particular conditions such as the climate, the diarrhoea, the unusual food, the phsyical and other strains are considered. After our practical experience and observations I do this as a principal.

As to the diagnosis I want to mention that except for very obvious cases it is our custom to examine fresh specimens, specimens treated with Lugol's solution, and stained specimens of the stools of all patients after provocative measures. The proctoscopy has been made as a routine measure for a long time. Here I am not in the position to give details on the treatment of amebic dysentery. We use Emetine and Yatren anyway; instead of the latter drug Enterovioform or small doses of Riboflavin are sometimes advisable. A Yatren enema should be combined with the oral administration of that drug. An icterus occurring in addition to amebic dysentery may be due to a liver abscess. Consequently emetine should regularly be employed. Hydrochloric acid preparations are recommended as a routine treatment. We also used the parenteral administration of liver preparations, while vitamins were given in exceptional cases only. In recent times we made an attempt with bismuth-arsin-acid preparations with obviously favorable results.

Annex

The Disinfection of Raw Vegetables and Fruits in the Tropics.

In the tropics the vegetables and the fruits are frequently contaminated with bacteria, amebic cysts and worm eggs by fertilization with human feces, by dust and flies, etc. As far as fruits with a skin are concerned, it is permissible to eat them, if they are peeled first. However, it must be insisted that they are peeled by the soldiers themselves and not by indigenous servants. Vegetables, however, which are prepared as salads, and fruits without a skin (such as strawberries, etc.) should be cleaned and disinfected, if there is any possibility to do this. For this purpose the most various suggestions were made.

VENDRAMINI (1939) sterilized strawberries by exposing them to a 1 % hydrochloric acid solution for half an hour. He reports that the taste of the strawberries is not impaired by such a treatment, if they are washed immediately afterwards in clean water. VAN DEN BRANDEN and GEENS (1938) report that salad can be disinfected by washing it for 10 minutes in commercial vinegar and subsequently cleaning in water. Numerous authors suggest the use of a potassium permanganate solution for the purpose of washing the vegetables. But they give almost no accurate data on the concentration of the potassium permanganate solution to be used. Some of them request a pink, others a dark violet solution. GAUDUCHEAU (1937) cleans strawberries in the following manner: The dirt is removed in water; then the fruits are placed into a diluted potassium permanganate solution (1:2 000) for a quarter of an hour. Following this procedure one cleans the fruit three or four times with pure water and permits the water to drain off. The chemical effect of the permangnate solution together with the mechanical effect of the cleansing was said to be sufficient to destroy or to remove all, or at least almost all bacteria, amebic cysts and ova. Contrary to that BERNHARD (1937) states that salad leaves may be contaminated with coli bacteria and staphylococci even after an exposure to a rather concentrated potassium permanganate solution (5%). In addition he stresses the fact that even after treatment with a solution of 0.1 % the salad is spoiled to such an extent that it cannot be offered for human consumption.

The most detailed statements on the resistivity of the cysts of the Entameba histolytica are found in a study of CRAIG and FAUST (1937). These authors stated that the cysts of the amebae remain alive in a diluted permanganate solution of 1:500 for a period of 24 to 48 hours. (In a humid ground the cysts allegedly are alive for more than 12 days, in water for 9 to 30 days.) Against chlorine they are also able to offer considerable resistance, for a hundred times that chlorine concentration is required to

kill them, which is usually employed for the disinfection of drinking water. Chloramine is still more ineffective than the pure chlorine. Even when exposed to strong poisons, such as a watery sublimate solution (1:2500) the amebic cysts remain alive for about 30 minutes. The same applies to the exposure to a o.5 % formalin solution.

Some of the authors give priority to the disinfection of the fruits by exposing them to boiling water. This seems indeed to be the most certain method. The suggestion is made in the text-book of RUGE, MUEHLENS and ZUR VERTH to expose the salad to boiling water for about 30 seconds. BRAUN (1929) is also of opinion that heating the fruits in boiling water for 30 seconds or in water of 65°C for 30 minutes is sufficient.

Discussion:

HABS recommends the use of potassium permanganate since hereby the cookhouse personnel are compelled to repeat the cleaning of the fruit.

WINKLER reports that dysentery bacilli are destroyed if the salad is immersed in hot water for 10 - 15 seconds.

RODENWALD: The problem of how to clean the fruit plays only a part during war and in peacetime has nothing to do with amebic dysentery and other diseases of the intestine. Therefore, in areas where topdressing is practized the strictest orders have to be given. Eat only vegetables the source of which is known. Therefore, it is suggested that the units themselves should cultivate vegetables.

Directions.

Memorandum concerning Amebic Dysentery.

General Rules.

Amebic dysentery is an infectious disease of the intestines, which is distributed throughout most of the tropical and subtropical countries. In the subtropics it particularly occurs during the hot summer months. From the intestines the infectious organisms may be carried via the blood to the liver and to other organs and may provoke abscesses there.

The infectious organism of the amebic dysentery is the Entamoeba histolytica, which is classified within the group of protozoae. It normally occurs in an inoffensive form in the lumen of the intestines, the so-called "Minuta"-form (precystic form, 12 to 15 µ in size) in the lumen of the colon and the cecum, without causing symptoms of the disease. The carriers of this precystic form of the amoebae

are healthy but under certain conditions may become dangerous to those near them. For, by a process of rounding off and by formation of a protecting membrane the permanent form, i. e., the cysts originate, which remain alive in the open air in the excreta, in the sewage, and in the superficial layers of water pools. The healthy carriers of amoebae continuously excrete amoebae with the stools. In consequence the clinically healthy carriers of amoebae are sources of a spread of amoebae. Unnoticed and without knowing it themselves, they help to distribute the infection throughout the units. In tropical regions and under primitive unhygienic conditions a high percentage of men may become carriers of the amoebae causing dysentery. In Europe, too, a certain percentage of persons is infested by the precystic ("Minuta"-) form of the entamoeba histolytica which, however, in cool regions rarely causes dysentery.

Infections take place when

1.) Hands, food, and water are soiled, particularly if fruits, vegetables and raw vegetables are contaminated by excreta containing cysts. In countries where top-dressing is customary, salads made from vegetables should not be eaten.

2.) The most important source of infection are the flies. From the human feces the cysts of the amoebae causing dysentery are taken in by the flies and excreted without being injured. Hence, the cysts may be carried by the flies over a large distance of space and time. Other vermin, (such as cockcroaches, rats) may also convey the cysts.

The disease is released, that means the amoebae invade the intestine wall, if this is impaired by a transitory or persistent diminution of its resistance, such as bacterial or other injuries of the colon, particularly by contamination with dysentery and bacteria which frequently occur in tropical regions. In the subtropics that invasion occurs predominantly during the hot seasons.

The course of amoebic dysentery shows different forms:

1.) The genuine, pure amoebic dysentery, 3 to 11 weeks after the unnoticed invasion of the amoebae into the colon walls (incubation period) an hemorrhagic, practically leucocyte-free and therefore completely transparent pink-colored gelatinous mucus is discharged with or without faces from the colonic ulcers, which were formed in the meantime. In this mucus the tissue-invading form of the amoebae is found by microscopic examination, in most cases containing ingested erythrocytes and showing the typical creeping movements. In contrast to that the mucus of the bacterial forms of dysentery has a milky or yellowish turbid appearance which is due to the high leukocyte content. In most cases the development of a genuine dysentery goes ahead slowly by further distribution of the colonic amoebic

ulcers throughout the colon. As a rule in the beginning no fever occurs, but subsequent to the insidious onset of the disease drawing pains in the hepatic, or splenic flexure of the colon are felt, sometimes also in the ileo-coecal region. If the first attack of the disease is not cured thoroughly, the genuine amoebic dysentery adopts the tendency to a chronic course with relapses. In such cases there is always a danger of perforation sometimes even during the first seizure of disease.

The feces of the patients suffering from amoebic dysentery, which contains exclusively tissue invading forms but no cysts, are not infectious in themselves. Therefore in most cases no real epidemics start in the sense that the amoebic dysentery is spread from the patients as a source.

In spite of this, above all in view of the occurrence of mixed infections the feces of persons suffering from or suspected of amoebic dysentery should for practical purposes be treated as if infectious material.

2.) The mixed amoebic dysentery: This is the basic disease which in most cases is caused by bacterial debris and amoebic dysentery associates with it. The mucus contains leukocytes and it is turbid. In most cases the disease sets in with fever and other toxic effects of the bacillary infection. In such cases dysenteric diarrhoeae immediately sets in. The incubation period of infection of the tissue with amoebae is considerably reduced, that means that tissue-invading forms appear in the feces very soon. If during repeated skilled inspection only "Minuta" (precystic) forms were exclusively found, the diagnosis amoebic dysentery is not permissible forthwith, even if there are symptoms suggesting dysentery. Under certain conditions the mixed amoebic dysentery may rapidly take a fatal course for which, however, the amoebic dysentery is of minor importance. The symptoms of the disease are principally determined by the kind of the basic bacillary disease. But there is danger of perforation too. This disease is particularly liable to relapse when associated with colds, excessive intake of alcohol when inappropriate or contaminated food is eaten, with undernourishment, and other diseases.

3.) If it is not treated at the right time, amoebic dysentery may become very chronic and may persist for decades as a chronic condition. It may be hidden behind latency, which continues over months or years, and behind an ostensible recovery or very insignificant symptoms. (Sensitive, weak intestine, occasional abdominal griping, particularly in the left part of the colon, alternating occurrence of constipation and diarrhoea, which is not of the dysentery type, nervousness, loss of weight, pale, unhealthy appearance). Occasionally, particularly after an inappropriate diet, after overexertion, after return to a hot climate the symptoms of an acute relapse with blood and mucus in the stools may reappear.

The presence of chronic ulcers may be the cause of a local peritoneal irritation and even of the formation of abscesses. In such cases one has to abstain from a premature surgical intervention and at first start therapy by drugs with observation of the blood count.

For distinguishing chronic amoebic dysentery from the chronid form of bacillary dysentery with which it may have common symptoms, in all cases of chronic dysentery a repeated bacteriological and serological examination is required.

4.) Mostly in the course of chronic amoebic dysentery, sometimes, however, in the course of an acute amoebic dysentery and even, if at first there were no clinical symptoms of an amoebic dysentery, tissue-invading forms of dysentery amoebae may be carried from the intestines to the liver and other organs. A hepatitis or an hepatic abscess are the most dangerous sequelae of an infection by amoebae. If such a complication is suspected endeavors must be made to transport the patients to a hospital where they must be admitted. The principal signs are: Irregular fever, frequently accompanied by rigors and profuse sweating, disorders of digestion, bronchial irritation and a dry cough, enlarged liver and tenderness of the inferior hepatic margin, pains which frequently radiate to the right shoulder, above all, however, an increase of the number of leukocytes (12 000 to 30 000 and more) and shift to the left. If the abscess is encapsulated the augmentation of the leukocytes may be small. In the stools dysenteric amoebae are present. With solid stools the minuta (precystic) form and cysts may be proven after provocation (Karlsbad salts). Patients with abscesses which have developed a longer time ago frequently bend the body to the right side when they are walking, supporting the congested and painful liver with the right elbow and the left fore-arm. The face and the conjunctivae show a subicteric discoleration. Larger abscesses of the liver may burst into the lungs or to the outside. The occurrence of primary pulmonary abscesses is rare. Abscesses of the brain, the spleen, or other organs are very rare.

II. Microscopical Diagnosis.

In view of the great number of clinical possibilities (enteritis, bacillary dysentery, amebic dysentery) microscopical evidence of parasites is absolutely necessary. This requires a special training to avoid an erroneous diagnosis. It is necessary to investigate the dysenteric stools or a fresh unstained specimen of material withdrawn by means of a proctoscope.

Only fresh stools which, if possible, are not older than one hour should be examined. There is no sense in investigating specimen which have been sent in over a long distance. The specimens (mucus or feces) are smeared on a slide by means of a lancet or a platinum hook and distributed with a physiological sodium chloride solution, if necessary. Attention must be paid to take neither too

small, nor too large a quantity of material. Cover it with a cover slip. The most appropriate magnification is the oil immersion and an ocular # 6. The shutter of the microscope must be sufficiently closed. The diagnosis is made sure by the occurrence of the typical pseudopodia of the entamebae histolyticae looking like a hernial sac and being most conspicuous, if prepared at body temperature, and by phagocytized erythrocytes in the cellular plasma of that microorganism. The nucleus of the entamebae histlcyticae is usually not visible in a fresh specimen. Attention must be paid to the number of leukocytes present in the mucus. If there is a genuine amebic dysentery, they are either entirely absent or present only in a small number. The treatment with Lugols' solution (4 % iodine) kills the entamebae and stains them. In this case the nucleus is demonstrable as a ring usually with a central enclosure. The principal source of errors is that leukocytes and other cells originating from the human organism are mistaken for entamebae or the cystic forms of the amebae. The diagnosis "necrobiotic amebae" is faulty in almost all cases. In doubtful slides the nucleus and the nuclear structure should regularly be examined in the iodine preparation of the specimens.

In vague cases and in chronic cases the diagnosis is made easier, if thin stools are provoked by the administration of Epsom salts or magnesium sulfate(1 to 2 table spoons in one glass of warm water in the morning while the stomach is empty.).

An admixture of urine to the stools disfigures the microscopical picture of the entamebae histolyticae.

III. Treatment of Amebic Dysentery.

1. General management: The patients must immediately be put to bed, and, if possible, admitted to a hospital. However, a difficult evacuation and over a long distance should be avoided (danger of perforation). The bowels should be thoroughly opened by 20 to 30 gm. of caster oil or 0.2 to 0.3 gm. of calomel. The abdomen should be warmed (abdominal protector or radiant heat). In difficult cases a hunger cure for three days should be attempted and only tea without sugar, rice water and oats boiled in water should be allowed. After a successful specific treatment (see below) a nourishing diet rich in protein is advisable such as milk rice, clear soup with the youlk of an egg, minced tender meat, mashed potatoes, semolina, fish, eggs with red wine, scrambled eggs, cream cheese, tender vegetables, bananas, minced apples, various nutrients, roborants, calcium-iron- liver preparations. During the second week an ordinary diet should gradually be administered, although fat, heavy and fermenting food such as legumes, corn bread and cabbage should be forbidden to the patients. The gastric juice very frequently contains no hydro-chloric acid; sometimes a complete achylia occurs. In these cases pepsin hydro-

chlrdc acid preparations should be given. The sodium chloride desire of the patients should be satisfied.

2. Treatment with drugs. Two different ways of treatment must be distinguished:

1.) The intramuscular or intravenous injection of 0.03 or 0.05 gm. emetine twice daily, but not more than a total dose of 1.0 gm., that means a period of treatment extended over 10 days at the maximum. The treatment may be repeated after an interval of 8-10 days. Emetin has only an effect on the amebae in the tissues (intestinal ulcers, abscesses). Hence, it effects only a clinical but no bacteriological restitution, (amebae carriers). The intravenous application of emetine is preferable effected through a syringe after adding 10 cc. of a 10 or 20 % dextrose solution. If nausea, vomiting, or neuromuscular weakness are observed the treatment has to be interrupted for a couple of days.

2.) Treatment through the intestinal surface. Drugs which come into effect in the intestines are:

Yatren, Riboflavin, Spirocid, Enteroform, Bismuth. A careful oral administration of these drugs results in an elimination of the amebae present in the intestinal lumen and the intestinal ulcers are cured by their penetrating effect.

Yatren pills (0.25 gm.) three times daily or less, 2-3 pills after eating, on the whole 80 to 100 pills during one course. If a severe diarrhea occurs the single doses should be reduced or the Yatren not given for 2 or 3 days. In such cases it is advisable to administer the Yatren and small riboflavin tablets or spirocid simultaneously.

2 Riboflavin tablets (Rivanoletten) (0,25 gm.) may be given 3 to 4 times daily for one week.

Spirocid: 2 tablets daily for 10 days.

An incurable and old chronic diarrhea (colitis) is preferable treated with enemas in addition to the oral therapy, the colon is thoroughly cleaned by high enemas. After 1 or 2 hours, preferably in the evening, 200 to 600 cc. of a 0.5 % Yatren solution (or a Riboflavin solution 1 : 10 000 to 1 : 50 000) at body temperature should be injected. If necessary 10 to 20 drops of opium tincture should be added so that the enema remains in the colon for about 20 to 24 hours. The daily volume of the injection fluid should gradually be increased with each day.

The permissible total dose of Yatren should not be exceeded, if it is given orally and rectally at the same time. The patients should be laid down in such a manner that the enema is retained for at least 8 to 12 hours. If this is not the case, the enema must be repeated.

It is useful to treat a clinically and microscopically diagnosed amebic dysentery (with tissue-invading forms) with

emetine and with a simultaneous rectal administration of drugs, to prevent subsequent complications, particularly liver abscesses.

One week after the treatment is accomplished, to prevent a relapse, the stools ought to be repeatedly examined and search must be made for vegetative and cystic forms of the entameba histolytica.

If there are any signs of hepatitis or of a liver abscess the treatment with emetin should be continued until the symptoms have disappeared.

The fully developed liver abscess needs surgical intervention.

IV. Preventive Measures.

A continuous instruction of the soldiers is the principal measure.

A.) It is desirable to avoid any contamination with the cysts of the entameba histolytica and any infection with bacteria promoting the outbreak of the amebic dysentery.

1. It is required to build suitable lavatories where flies can gain no access. If this is not possible, the excreta must be covered with earth (spade method).

2. The flies must be kept away by building lavatories protected against the flies and by clearing the camps from food remnants, garbage, etc. (see leaflet: Fly Protection HDV 209 # XXI).

3. Care should be taken that all foodstuff is stored in such a way that no flies gain access to it. Food must not be left uncovered on tables.

4. Orders should be issued forbidding the drinking of unboiled water, which has not been filtered through a filtering apparatus immediately above, even if this water is supplied in water cans.

The water cans have to be disinfected at least once a month according to the orders of the medical officer of the unit. This is done by dissolving completely 20 water disinfecting tablets in about 1 liter of water. This solution is immediately placed in the water can which is then filled up with water. The disinfecting solution should be left there for half an hour.

5. Attention must be paid when the dinner pails are cleaned. Facilities should be provided as much as possible to wash them with hot water.

6. Fruits and vegetables must be carefully cleaned in boiled water. Fruits should be peeled after that procedure. Fruits which cannot be peeled, vegetables, and

salad which are eaten without being boiled have to be disinfected. The only procedure which was hitherto recognized as efficient is to dip the fruits and the vegetables into boiling water for 30 seconds. The chlorine taste is removed by washing them with boiled water. No iced drinks. Cookhouse personnel must be examined from time to time as to their being contact carriers of the entameba histolytica.

7. A close social intercourse between the soldiers and the indigenous population which increases the number of possibilities of contact infections should be prevented. If it is impossible to avoid contact with the indigenous people, the hands should be washed afterwards.

8. Warning against swimming in stagnant water or rivers. Sea bathing is permissible.

9. The soldiers have to be ordered to report any excretion of mucus or blood with the stools to the medical officer, even if there are no other disorders or diarrhea.

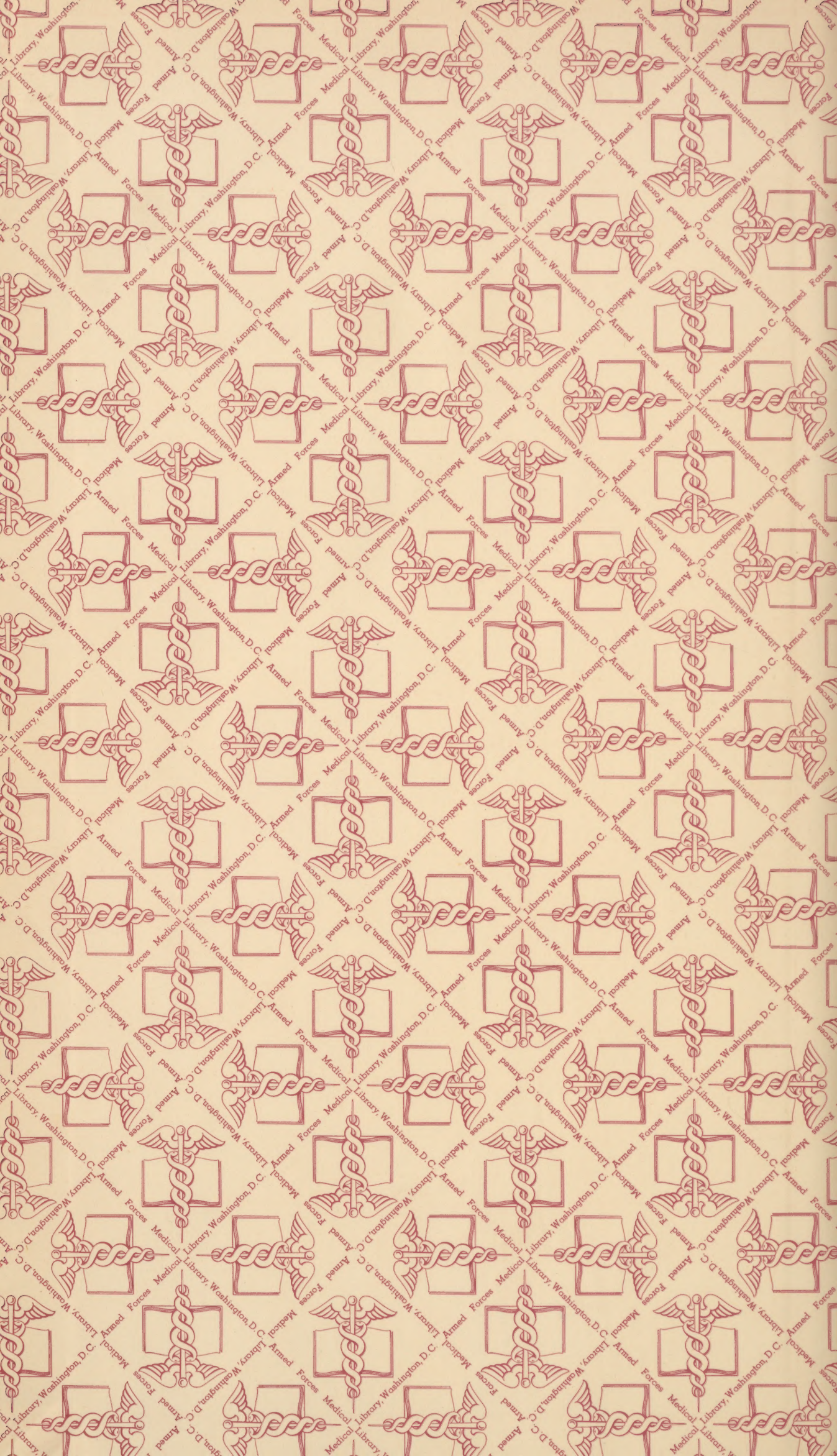
10. Attention must particularly be paid to every soldier washing his hands after defecation. If possible, this should be done in order to avoid any danger to the unit.

B.) The disposition to infection must be reduced by:

1. A sufficient and suitable diet.

2. Prophylaxis to avoid diseases due to cold and other diseases by providing abdominal protectors, a sufficient supply of blankets and warm clothing. It is important to insist on an appropriate use of such items according to the orders.

3. It is necessary to give repeated short and impressive instructions to the men during which reference should be made to local conditions. During the hot months of summertime all measures should be carried through with particular care.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